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LECTURES ON BOTANY,

AS DELIVERED

IN THE

BOTANIC GARDEN

AT

LAMBETH.

BY THE LATE

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FLORA LONDINENSIS,

&c. &c.

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INTRODUCTORY

LECTURE.

SECTION I.

GENTLEMEN,

THE ſeaſon of the year ſeems now to invite you to the purſuit of Botany; a ſcience which, if not eſſentially neceſſary to you in the line of any particular profeſſion, is at leaſt deſerving ſome ſhare of your attention as men, as rational beings.

Of all the ſtudies which engage mankind, few are attended with circumſtances equally pleaſing in their purſuit, few can boaſt that infinite variety of objects which are perpetually engaging the attention, few that are ſo conducive to the health of the ſtudent.

The Botaniſt neither breathes the putrid air of the diſſecting room, nor inhales the noxious effluvia of the laboratory; but, as he freely ranges the fields, all that is ſweet to the ſmell, all that can charm the eye or ear, burſts forth on every ſide and crouds upon his ſenſes.

It is a ſcience which has been cultivated by the wiſeſt of mankind, and particularly by the moſt diſtinguiſhed profeſſors of the medical art. Here, as philoſophers we may admire and contemplate the beautiful works of an Almighty Being:—what an infinite diſplay of wiſdom is obſervable in the manner in which plants grow and are propagated!—what care is taken in perpetuating the ſucceſſion of each ſpecies!—how admirably are they adapted to every ſoil and ſituation, ſo as to leave no part of the globe, not even rocks and ſtones uncovered!—with what regular order, and in what conſtant ſucceſſion, do they flower and produce their ſeeds!—in ſhort, a mind that is of an inquiſitive or contemplative turn, will find in plants an endleſs ſource of innocent and inſtructive amuſement. Another world as it were opens to his view; he ſees the face of nature with different optics; and has the ſuperior pleaſure of being able to read in that book which to the generality of mankind is a mere blank.

It has been the opinion of many, that the benevolent Author of nature has given to each country plants proper for the cure of diſeaſes peculiar to its inhabitants, and many good reaſons may be brought in ſupport of that opinion. We are not to expect however that every plant poſſeſſes medical qualities. Many no doubt were intended ſolely as food for the various animals, for clothing, and other wiſe purpoſes in the economy of nature; but this ſhould not prevent us from attempting to diſcover the qualities of plants which may happily prove antidotes to diſeaſes, as yet the *opprobria medicorum.* What heart-felt ſatisfaction muſt attend the perſon who ſhould diſcover a ſpecific for cancers, or any other dreadful diſeaſe. It were to be wiſhed that the faculty were as eager after diſcoveries of this kind, as chemiſts were formerly in the ſearch after the philoſopher's ſtone: the proſpect of ſucceſs is perhaps more promiſing, the attempt at leaſt is much more laudable.

The importance of this ſcience as a branch of medical knowledge, is happily expreſſed by the late ingenious Dr. GREGORY, the ornament of his profeſſion, and I may add, of human nature, in his advice to the young phyſician: he thus expreſſed himſelf on this ſubject; "The ſcience of Botany is ſubſervient to the practice of phyſic, as far as it facilitates the knowledge of plants, by reducing them into the moſt commodious and perfect ſyſtem; and though it is not neceſſary to be particularly acquainted with the name and hiſtory of every plant, yet every one ought to be ſo well founded in the principles of Botany, as to be able to find its place in the ſyſtem, and to deſcribe it ſcientifically; and we ought to be particularly acquainted with every material circumſtance relative to thoſe plants which are uſed in diet or medicine."

Yet, notwithſtanding the acknowledged utility of this ſcience, notwithſtanding profeſſors of medicine are warm in its recommendation, it is much to be regretted that gentlemen of the faculty are ſo little acquainted with it practically: even in the country, where plants obtrude themſelves on the notice of the moſt common obſerver, how few are there who know with certainty the plants they uſe.

I have been moſt credibly informed, that when Dr. WITHERING, a gentleman diſtinguiſhed not leſs for his medical than his botanical ſkill, went to reſide at Birmingham, he found ſome of the medical people there making an extract from the cow-parſley inſtead of hemlock; and it is much to be feared, that miſtakes of this ſort frequently fruſtrate the well-meant endeavours of the phyſician.

Although newly-diſcovered chemical remedies and foreign drugs may have juſtly ſuperſeded many of our Engliſh plants, yet a great number are ſtill retained in our Pharmacopœia: to be acquainted with theſe at leaſt is the duty of every one that takes upon himſelf the important character of guardian of the health of mankind.

I cannot better illuſtrate how neceſſary a knowledge of plants is, particularly to medical gentlemen reſident in the country, than by reciting an extract from a letter which I received ſome few years ſince from Mr. LOWE, ſurgeon at Preſton in Lancaſhire, a gentleman who had formerly been my pupil.

"On Thurſday the 5th of June, Mr. Freckleton, a healthy ſtrong man about thirty-five years of age, a publican in the town, eat a handful of fool's-parſley with nearly the ſame quantity of young lettuce, about one o'clock at noon; in about ten minutes he was affected with a pain and hardneſs in his ſtomach and bowels, attended with a rumbling; he walked out into the fields, but was ſeized with ſuch languor, wearineſs and weakneſs, that it was with difficulty he ſupported himſelf till he got home; he was much troubled with giddineſs in his head, his viſion was confuſed, and ſometimes objects appeared double: at ſeven o'clock he took an emetic, which brought up, as he ſuppoſes, all the fool's-parſley he had eaten, but not any of the lettuce; this conſiderably relieved him from the uneaſy ſenſations in his bowels, but the other ſymptoms continued, and he paſſed a reſtleſs night. Next day he had much pain in his head and eyes, which laſt were inflamed and bloodſhot: he had different circumſcribed ſwellings in his face, which were painful and inflamed, but they were tranſient, and flew from place to place; this night he took a powder which made him ſweat profuſely. On Saturday his eyes were highly inflamed, painful, and entirely cloſed by the ſurrounding inflammation; this day he was bled, which gave him much eaſe in his head and eyes. From this time until Monday he continued to get better; but had, even then, pain, heat, and inflammation in his eyes, with œdematous ſwellings of his cheeks; his remaining ſymptoms went off gradually, and he is now well. He had been told that the plant which he had eaten was hemlock; to be ſatisfied, I accompanied him into the garden where he had gathered the plant, and found it to be the æthuſa cynapium, or fool's-parſley. To be convinced of this beyond a doubt, I compared a ſpecimen of it with the figure and deſcription of the plant given in the *Flora Londinenſis*, with which I found it exactly to correſpond."

Independent of the ſingular ſatisfaction which Mr. Lowe muſt feel from knowing the plant in queſtion, an advantage has ariſen to the public; the poiſonous quality of the fool's-parſley is aſcertained, which before was only ſuſpected. Time, and a taſte for ſcience which of late years has made ſuch rapid advances and ſuch material improvements in every branch of medicine; which has introduced a rational practice, founded on an intimate knowledge of the animal economy, and an accurate hiſtory of diſeaſes; which has reſcued ſurgery from the hand of pretenders, and taught mankind to repoſe a confidence in thoſe only who have laudably exerted themſelves in acquiring anatomical knowledge; which has redeemed chemiſtry from empirics, and made it ſubſervient to the practice of phyſic, will, it is preſumed in a few years, place Botany in a more favourable point of view, and cauſe its utility in medicine to be more generally acknowledged.

But it is not to medicine alone that Botany is ſubſervient; perhaps it may be applied with as much advantage to Agriculture; a ſcience which, in this enlightened age, when arts and ſciences are carried to a pitch unthought of in former times, we might expect that a nation celebrated not leſs for its arts than its arms, ſhould be among the firſt to promote, as improvements in it are the only ſolid check to the baneful and enervating effects of luxury and diſſipation: accordingly we find many of our nobility, gentlemen of landed property, and public ſocieties, fully aware of its importance; and endeavouring, by premiums, and a variety of other means, to improve it. Much however ſtill remains to be done, nor is it probable that their endeavours will be crowned with ſucceſs until Botany is more cultivated; nor until plants, particularly the graſſes, are better underſtood.

I am inclined to ſuppoſe, that this inattention of the faculty and others to Botany, has proceeded in a great meaſure from a want of opportunity to acquire it; and that, if the ſame means were afforded as for other ſciences, there would no longer be cauſe of complaint or cenſure.

I ſhall eſteem myſelf moſt happy if, by the inſtitution of theſe lectures, I ſhould prove in the leaſt degree inſtrumental to its advancement: but conſcious how inadequate my abilities are, fully to anſwer your expectations, I enter on the office with diffidence, truſting that you will receive my well-meant attempt with candour and good nature.

To contribute to this deſirable end, my labour and my ſmall abilities ſhall moſt readily be devoted; much however will depend on your own diligence. To ſet you in the right path, and to accompany you a little way on your journey, will be to me a very pleaſing taſk; and all, I preſume, which you can expect from any preceptor. To arrive at perfection in this moſt agreeable ſcience, muſt be the effect of your own induſtry and application.

Botany, or the ſcience which teaches us to diſtinguiſh one plant from another, is of very great, nay almoſt infinite, extent. To know every plant which grows on the ſurface of the earth, is altogether impoſſible: to know perfectly the native plants of our own country, with all thoſe which have at different periods been introduced into our gardens from foreign parts, would, I am confident, occupy the whole of a man's life, let his taſte for the ſcience, or his application to it, be ever ſo great. Seeing then that a compleat knowledge of plants is not to be attained, let us endeavour to direct our attention to that part of it which it is in our power to acquire; and which, when acquired, will be of the greateſt advantage to us.

Botaniſts may be divided into two kinds;

the theoretic and the practical. By the practical Botaniſt is to be underſtood, one who is capable of naming a plant at ſight, but is unacquainted with the names of the ſeveral parts which compoſe it, and incapable of finding it out in any ſyſtematic arrangement. Such are the generality of ſimplers who acquire their knowledge traditionally, or from figures, and may be compared to perſons who cannot read.

The theoretic Botaniſt is one who may be well acquainted with the ſeveral parts which compoſe a plant; may know the names by which each part is diſtinguiſhed, and can aſſign to them their ſeveral uſes; is well verſed in the hiſtory of the ſcience, and the various ſyſtems that have been publiſhed; perhaps a perfect judge of their ſeveral merits and defects, yet at the ſame time poſſeſſes very little practical knowledge of the plants themſelves. Botaniſts of this ſort however are few in number, and chiefly to be found amongſt men of ſedentary lives; who are more fond of ſtudy than of active employment, of books than herbarizing.

It muſt be obvious that theſe two muſt unite to form the ſcientific and uſeful Botaniſt; and as the practical part ſhould be ingrafted on the theoretic, ſo one grand object with you ſhould be to acquire a knowledge of ſome ſyſtem, as the key which will unlock to you the whole treaſures of the vegetable kingdom. But, before you can with propriety enter on this part of the ſubject, it will be neceſſary for you to be acquainted with the ſeveral parts of which a plant is compoſed, beginning with the root, and tracing them up to the ſeed. While you are acquiring this knowledge, which we ſhall endeavour to impart to you in our enſuing lectures, the practical part muſt not be neglected: and here, in the firſt place, the plants of our own country ſeem to demand your particular attention. For theſe, you ſhould not let ſlip opportunities of herbarizing excurſions; of the plants collected in which, by the aſſiſtance of the outlines of Botany in general, you will ſoon be able to place each ſpecimen in its proper place, and raiſe a ſyſtematic memorandum to your future aſſiſtance.

Now in order to attain a knowledge of the ſtructure of the ſeveral parts of the flower and fruit, you cannot diſſect and examine too many different kinds; and to obtain a knowledge of thoſe plants whoſe names you may acquire, it is neceſſary you ſhould either dry or preſerve them, as an anatomiſt would his anatomical preparations, or that you make drawings or take impreſſions of them. For it is ſcarcely poſſible for the beſt memory to retain the name of a plant by once hearing it; but by having a dried ſpecimen of the plant, a drawing, or impreſſion of it, with the name affixed, by turning theſe over now and then, a knowledge of them is kept freſh in the memory.

As the drawing of plants requires not only a particular genius, but will take up a great deal more time than falls to the lot of moſt ſtudents, ſo it is not to be generally recommended. Yet, where a Botaniſt has time and abilities, he will find the drawing of plants not only an agreeable amuſement, but that the attention neceſſarily paid to the plants in drawing of them, will ſtrongly fix a knowledge of them in the memory.

The taking of impreſſions from the plants themſelves is perhaps worthy of more attention than has been paid to it, as by this means a likeneſs of almoſt any plant may be obtained in a few minutes; and ſuch a likeneſs as will ever after ſerve to give an idea of the original ſtill more compleatly if it be coloured from nature, though in a rude manner. To ſucceed in this, procure from a letter-preſs printer two balls, ſimilar to thoſe which they make uſe of in printing, with this difference, that they ſhould be covered with a white ſheep-ſkin, ſuch as is uſed for making gloves of, or ſpreading plaſters on; or in lieu of theſe, two pieces of ſoft leather, with tow or wool tied up in them, may be ſubſtituted; a ſmall quantity of printer's ink may be had at the letter-preſs or copper-plate printer's; or a mixture of ivory black well ground with boiled linſeed oil, about the ſize of a hazel nut, is to be put on one of them; the two balls are then to be dabbed together until the ink is very thinly and evenly diſtributed over both ſurfaces.

The ſpecimen, which ought to be expreſſive of the habit of the plant, and to have been the preceding day expanded and lightly preſſed between the leaves of a book, is then to be placed evenly on one of the balls, and repeatedly dabbed with the other. If the plant be very large, it will be neceſſary to cut it into two or more pieces; the uppermoſt ball is then to be dabbed ſeveral times on the plant till the fibres of the leaves and the ſtalk become viſibly black. The plant is then to be taken off the lowermoſt ball, and laid on one ſide of a ſheet of thick writing paper, the other ſide of the paper being laid over it, the leaves and the ſtalks are to be preſſed and rubbed over with the palm of the hand, or ball of the thumb pretty hard, but not ſo hard as to ſqueeze out the juices of the plant; taking particular care that the plant is not moved during the operation, which is very likely to happen. Thus an impreſſion of each ſide of the plant may be obtained; of which the underſide, as being the moſt fibrous, is generally the moſt beautiful. Particular care ſhould alſo be taken that too much ink be not applied, as it will have a very diſagreeable effect both in the plain impreſſion and in the coloured one. Thoſe who would wiſh that the flowers ſhould appear diſtinct and perfect, ſhould take them off the plant, expand them, and colour them on the ends of the ſtalk afterwards.

It muſt occur to every perſon that there are many parts of plants that cannot well be repreſented in this way, as berries of all kinds for example, fruits, &c. If the artiſt has any taſte for drawing, when he has coloured the plant and flowers, he can readily repreſent with a proper colour either the berry, fruit, or ſeed veſſel of the tree or plant, when it happens to be ſtriking; and if the colour be natural, the delicacy of the finiſhing is not to be regarded, as it is not to be conſidered as a fine painting, but a ſufficient likeneſs, executed by a common hand, in a ſpeedy manner.

Another mode of taking off impreſſions has lately been introduced, in which ſmoked paper is ſubſtituted for blacking balls, and in the opinion of ſome this method is moſt preferable. To prepare the paper, rub it over firſt with linſeed oil, then ſmoke it over the flame of a large tallow candle, moving it to and fro, that the paper does not take fire till the whole ſurface is regularly blacked over. The leaf or plant is then to be laid on the ſmoked paper, preſſed, and rubbed till the fibres become black; the impreſſion is then to be taken off on a piece of white paper, as in the other way.

There are no plants look more beautiful taken off in this manner than the ferns.

The moſt common and perhaps the moſt ſatisfactory mode is to dry and preſerve the plant itſelf. If a perſon will beſtow the neceſſary time and pains, plants may be dried and preſerved ſo as to retain their form, many of them their colours, and make a beautiful appearance; even with the greateſt care there are many that will loſe their colours, and ſome will even change black, as the cow-wheat, whilſt others look almoſt as lively when dried as when alive; it is in vain therefore for you to expect that your dried ſpecimens will aſſume an uniform appearance.

There are various ways of drying and preſerving plants; the whole art of which conſiſts in drying them under ſuch a degree of preſſure that the leaves and flowers ſhall neither ſhrink nor be ſhrivelled, while the plant at the ſame time has as much air as is neceſſary to its drying of a good colour, and preventing it from turning black or mouldy.

The method of obtaining dried ſpecimens in the greateſt perfection is as follows. You are in the firſt place to be particularly careful to ſelect a good ſpecimen of the plant, as that requires no more trouble to preſerve than a bad one. By a good ſpecimen is to be underſtood ſuch an one as repreſents the true habit and general appearance of the plant, of its common ſize, in full bloom, and perfectly dry.

Such a ſpecimen being procured, we are to lay it out between the leaves of a ſingle ſheet of paper, it is of little conſequence what kind of paper, provided it is not too coarſe, carefully expanding every leaf and flower, but not in ſuch a manner as to give them a ſtiff unnatural appearance; we are then to place this ſingle ſheet of paper containing the plant, betwixt the leaves of a large book, laying a weight on the book juſt ſufficient to make the plant flat, but not to bruiſe it.

After remaining a day or two in this ſituation, the ſingle ſheets of paper containing the plants, are to be taken out of the book, placed on the floor in a dry room, or expoſed to the ſun, and covered with dry ſand about an inch thick. The weight of the ſand will be ſufficient to keep the plant from ſhrivelling, while the moiſture of the plant evaporates through its interſtices; and thus, if the ſituation be dry, and more particularly if artificial heat be made uſe of, the plants, if not very ſucculent, will dry quickly, and of a good colour.

Should this method of drying them by means of ſand be thought too troubleſome, or be impracticable for want of ſuitable accommodations, the plants may be continued betwixt the ſingle ſheets of paper in the large book till dry, taking them out frequently to give them air, and replacing them in the ſame book made perfectly dry, or putting them into another; or a number of quires of paper may be ſubſtituted inſtead of a book; by thus alternately expoſing them to the air and keeping them under preſſure, you will obtain very good ſpecimens.

Too much care cannot be taken of a collection of plants thus carefully made; they are moſt liable to ſuffer from being kept in a damp ſituation, or from the depredations of inſects. They require therefore to be kept in a place perfectly dry, impregnated with the effluvia of camphor, and to be often looked over. Now whichſoever of theſe methods you ſhould adopt, whether you draw your plants, take impreſſions of them, or preſerve them, it will be neceſſary in your herbarizing excurſions, to take with you a tin box, or a book to put them in.

The advantage of a tin box, or vaſculum is, that not admitting any air, the plants are preſerved freſh till you get home, when you may diſpoſe of them as you pleaſe; the larger the box, the larger it will admit your ſpecimens to be. A ſmall ſize folio book, provided with ſtrings inſtead of claſps, that the plants may not be bruiſed, is on many accounts to be preferred; if this be uſed, each plant, for the more readily turning to it, is to be placed in the order of its being gathered.

As it will be neceſſary for you to diſſect a variety of flowers, and other parts of plants, a penknife, a common lancet, with a large pin or needle, ſhould be your conſtant companions; and as many flowers, or the parts of which they are compoſed, will frequently require to be magnified, a ſmall pocket lens ſhould be added, for the examination of them.

As a proper ſelection of books in the learning a ſcience muſt be of material conſequence, the mind retaining the firſt principles it imbibes in an eager purſuit, we ſhall venture to give you a few inſtructions on what books will be moſt proper for you to read; and we may premiſe that many will not be neceſſary for you at preſent. We are not ſo vain as to imagine that the information you may acquire from our lectures will be ſuch as to preclude the uſe of botanical books; nothing is farther from our intention: all that we mean to infer is, that you will ſtudy with much greater advantage when you come to be ſomewhat acquainted with the ſubject.

The knowledge you may derive from our

lectures will perhaps ſave you the trouble of ſearching ſeveral more voluminous works, but the practical knowledge of plants will be better acquired, and more perfectly impreſſed on the memory, by frequent excurſions, and preſerving the ſpecimens till you are thoroughly acquainted with them. This I know, books cannot afford adequate aſſiſtance, but to ſuch as cannot, for want of ſuitable parts of the day to attend to it, or to thoſe who cannot ſpare time from other purſuits, we may in particular recommend the peruſal of the following books, which may be divided into three claſſes: viz.

1ſt. Such as treat of the rudiments of the ſcience, or explain its terms, and which may be conſidered as of the introductory kind.

2d. Such as treat particularly of the Britiſh plants.

3d. Such as treat of the genera and ſpecies of plants generally. We may enumerate,

Berkenhout's Lexicon Botanicum.
* Milne's Botanical Dictionary.
Martyn's Language of Botany, 2d Edit.
Lee's Introduction to Botany.
Rouſſeau's Letters on the Elements of Botany, tranſlated by Profeſſor Martyn, with many additional Letters. 2d Edit.
Linnæi Philoſophica Botanica.
Roſe's Tranſlation of the ſame book.
The Termini Botanici of Linnæus, publiſhed by Dr. Rotherham, a ſmall 12mo.

In the 2d claſs, or ſuch as treat of the plants of this country, we may ſelect

Raii Synopſis, 1 vol. 8vo. 3d Edit.
Hudſon's Flora Anglica, 2 vols. 8vo.
Lightfoot's Flora Scotica, 2 vols. 8vo.
Withering's Botanical Arrangement of the Britiſh Plants, 2 vols. 8vo. 2d Edit.

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* A new edition of this work, greatly enlarged and improved, with all the modern discoveries, and embellished with Twenty-five new Plates, engraved by Sansom, from drawings made on purpose by Sydenham Edwards, F. L. S. was published in May, 1805, price 1l. 1s. plain, or 1l. 15s. coloured, and will be found highly necessary to students and others in botany, superseding the use of most others as a book of reference.

(a 3d and 4th edition have ſince been publiſhed, but for thoſe who underſtand Latin, Dr. Smith's Flora Britannica may ſuperſede theſe).

Ditto by Dr. Stokes.

Berkenhout's Outlines of the Natural Hiſtory of Great Britain, 2 vols.

Broughton's Encheiridion Botanicum.

Dr. Smith's Compendium Flora Britannicæ may be ſubſtituted for this with advantage.

Curtis's Flora Londinenſis, 2 vols. folio.

Smith's Engliſh Botany with Plates, by Sowerby.

Tranſactions of the Linnæan Society.

Of the 3d claſs, or ſuch as treat of the genera and ſpecies of plants generally, we would recommend

Linnæi Genera Plantarum.

The Litchfield Tranſlation of the ſame, in 2 vols.

Juſrier's Genera Plantarum.

Linnæi Species Plantarum.

(an edition of this is now publiſhing

by Willdenow, containing the modern *diſcoveries).*

Linnæi Syſtema Vegetabilium, or

The Litchfield Tranſlation of the ſame, in 2 vols.

This however is but a very ſhort catalogue of botanical books, yet an acquaintance with theſe will give you a pretty general idea of the ſcience of Botany. Such as wiſh to be more minutely acquainted with the ſubject, and to obtain a general knowledge of the ſeveral treatiſes that have been written on Botany, ſhould conſult the Bibliotheca Botanica of the learned Haller, who has not only given a compleat catalogue of them, but a ſhort account and critique on each.

SECTION II.

On Plants compared with Animals.

BOTANY, as we before obſerved to you, is a ſcience which teaches us to diſtinguiſh one plant from another.

A plant is defined by botaniſts to be a body endowed with life, deſtitute both of ſenſation and *locomotive* power, capable of imbibing nouriſhment, increaſing and finally propagating its ſpecies. Different authors have differed ſomewhat in their definitions, but a want of ſenſation or perception, and an inability of moving from the ſpot to which it is fixed, have been conſidered by moſt of them as the criterion by which a plant may with certainty be diſtinguiſhed from an animal.

The learned and ſcientific biſhop of Landaff, who has written on this particular ſubject with that perſpicuity and ingenuity ſo peculiarly his own, informs us that he knows of no character to be relied on that will diſcriminate animals, vegetables and minerals, as oppoſed to one another; he obſerves, "every one thinks he knows what an animal is, and how it is contradiſtinguiſhed from a vegetable; a dog or a horſe he is truly perſuaded are beings as clearly diſtinguiſhed from an herb or tree, as light is from darkneſs; yet as in theſe, ſo in the other productions of nature, the tranſition from one to the other is effected by imperceptible gradations.

"The locomotive powers which appertain to moſt animals are ſo manifeſt in quadrupeds, birds, fiſhes and inſects, that in our firſt and ſuperficial enquiries into nature, we are apt to conſider the poſſeſſion or want of theſe powers as making a deciſive and eſſential difference betwixt animal and vegetable bodies, yet on a cloſer examination we find there are a great number of animals which, like the limpet, are fixed to one ſpot, and are deſtitute of every power of progreſſive motion."*

From a variety of circumſtances, obſervable in the economy of vegetables, the learned prelate is of opinion, that plants are not wholly deſtitute of perception. The perception of a man, he obſerves, "ſeems to be indefinitely greater when compared with that of corallines, ſea-pins, and oyſters, than the perception of theſe, which are allowed to be animals, doth, when compared with the ſigns of perception manifeſted by a variety of what are called vegetables. Sponges open and ſhut their mammillæ; corals and ſea-pins protrude or draw back their ſuckers; ſhell-fiſh open or keep cloſe their ſhells in ſearch of food or to avoid injury; it is from theſe and ſimilar muſcular motions, that we judge the beings to which they belong to have perception; that is, to be animals. Now in the vegetable kingdom, we may obſerve the muſcular motions of many plants to be to the full as definite and diſtinguiſhable as in the claſs of animals juſt mentioned. The plants called Heliotropiœ turn daily round with the ſun: by conſtantly preſenting their ſurfaces to that luminary, they ſeem as deſirous of abſorbing a nutriment from its rays, as a bed of muſcles doth from the water, by opening their ſhells upon the afflux of the tide.

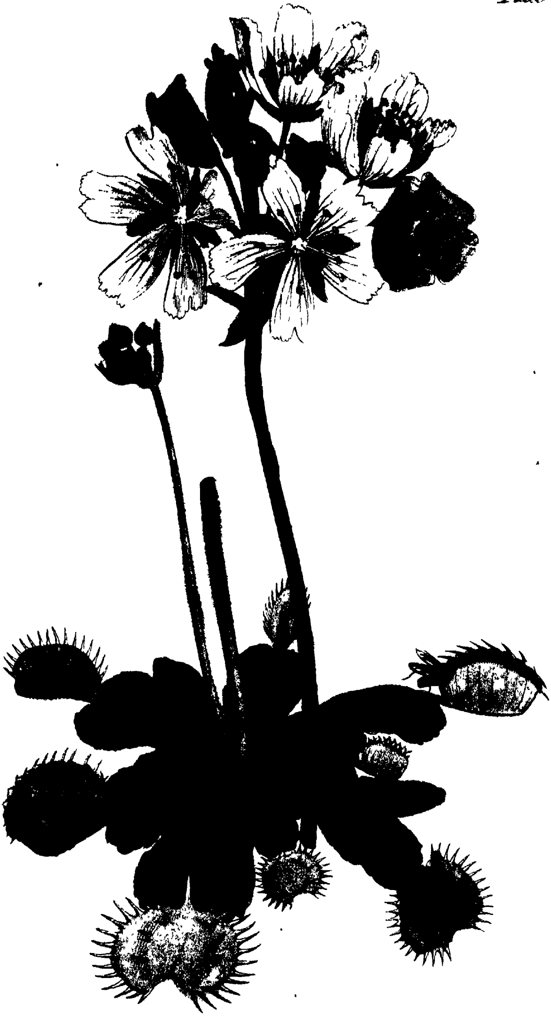
The Flores Solares are as uniform in their opening and ſhutting, as animals are in their times of feeding and digeſting; ſome in theſe motions do not obſerve the ſeaſon of the year, but expand and ſhut up their flowers at the ſame hour in all ſeaſons; others open later in the day, or do not open at all when they are removed from a Southern to a more Northern aſpect. Trefoil, Wood Sorrel, Mountain Ebony, Wild Senna, African Marigold, &c. are ſo regular in folding up their leaves before rainy weather, that they ſeem to have a kind of inſtinct or foreſight ſimilar to that of ants: young trees in a thick foreſt, are found to incline themſelves towards that part through which the light penetrates, as plants are obſerved to do in a darkened chamber towards a ſtream of light let in through an orifice; and as the ears of corn do towards the South. Whatever can produce any effect upon an animal organ, as the impact of external bodies, heat and cold, the vapour of burning ſulphur, of volatile alkali, want of air, &c. are found to act alſo upon the plants called ſenſitive: but not to inſiſt upon any more inſtances, the muſcular motions of the Dionæa Muſcipula, lately brought into Europe from America, ſeem far ſuperior in quickneſs to thoſe of a variety of animals. Vide *plate* 1.

Now to refer the muſcular motions of

ſhell-fiſh and zoophytes to an internal principle of volition, to make them indicative of the perception of the being, and to attribute the more notable ones of vegetables to certain mechanical dilations and contractions of parts occaſioned by external impulſe, is to err againſt that rule of philoſophizing which aſſigns the ſame cauſes for effects of the ſame kind. The motions in both are equally accommodated to the preſervation of the being to which they belong, are equally diſtinct and uniform, and ſhould be equally derived from mechaniſm, or equally admitted as criterions of perception.

Our author next produces inſtances from the generation, nutrition, organization, life, health, ſickneſs, and death of plants, ſtill further to prove the cloſe affinity betwixt animals and vegetables, and to the peruſal of which we muſt refer our readers who wiſh for more information on this curious ſubject; leaving which, we proceed to the more im-

Plate 1



Syd Edwards del *Pub by S Curtis Florist Walworth May 31 1822.* *F Sansom sculp*

PLATE I.

THE DIONŒA MUSCIPULA,

OR,

VENUS's FLY TRAP.

To illuſtrate the ſigns of perception in plants, this plant, though not very common in this country, is ſelected, being well known by Botaniſts in general to poſſeſs the ſenſitive property in an eminent degree.

Our figure repreſents the general habit of a healthy plant, with the expanſion of that part which poſſeſſes ſuch extreme irritability, and which is ſo beſet with ſharp prickles at the edge, as to reſemble a rat-jin or trap; if a fly or other inſect comes within its margin, it cloſes on them and holds them till they periſh; a figure of one in that ſtate being here repreſented.—Vid. Dr. Smith's Obſervations on the Irritability of Plants.

mediate object of our Lecture, which is to point out to you the ſtructure of the ſeed, and the manner in which it unfolds itſelf and *becomes a plant.*

SECTION III.

On Seeds.

THE ſeeds of vegetables may be conſidered as analogous to, and with reſpect to generation, anſwering the ſame purpoſes as, the eggs of animals; for by means of theſe plants are chiefly propagated. Every ſeed if perfect and properly impregnated, is capable, when placed in a proper ſituation, of becoming a new plant ſimilar to its parent.

We ſhall now point out to you its particular ſtructure while a ſeed, and the manner in which it unfolds itſelf and becomes a plant.

Moſt ſeeds are compoſed of the ſame eſſential parts, and the proceſs of vegetation is ſomewhat ſimilar in all; there are ſome ſeeds however in which thoſe parts are more obvious than in others, ſuch as the large garden bean, and French bean, &c. In theſe you will ſee all the parts very diſtinctly; and when they are once pointed out, you will readily acquire a clear idea of their ſtructure.

On diſſecting the garden bean, we find it to conſiſt of the

HILUM, or the eye.
CUTIS, or the huſk.
CORCULUM, or Embryo of the future plant.
COTYLEDONS, or the lobes. *Vide pl.* 2.

Beſides the *cutis* or huſk, ſome ſeeds are furniſhed with an additional covering, which Linnæus calls an *arillus*; this is obſervable in the Hounds-tongue, Ranunculus, and other ſeeds: and moſt ſeeds have, in one particular part of them, a ſmall *foramen* or hole.

1ſt. The HILUM, or eye, is a mark in the end or middle of the outer huſk of the ſeed, and is a kind of cicatrix, formed by the breaking off of the veſſels to which the ſeed was connected, and which ſupplied it with nouriſhment. In the large garden, or Windſor bean, it is placed at the end; in the kidney or French bean, it is ſituated in the middle.

2d. The CUTIS, or huſk, which incloſes and preſerves the Cotyledons and Corculum; this is evidently compoſed of two coats, and is thicker round the hilum than in any other part of it; on one ſide it has a duplicature which incloſes the end of the radicle; this duplicature is very conſpicuous when the bean is cut tranſverſely through the middle; *vide plate* 2.

Juſt below where the point of the radicle terminates, a ſmall *foramen* or hole is obſervable in all thoſe ſeeds at leaſt which are of a tolerable ſize; it is ſo ſmall however in general as to require the aſſiſtance of a magnifying glaſs: in the French bean it may be clearly diſcovered betwixt the hilum and point of the radicle, even by the naked eye. This foramen is conſtant and uniform in its appearance, and does not ariſe from the breaking off of the ſtalk, which connected the ſeed to the ſeed-veſſel. If at any time we are at a loſs to find this foramen, ſoak the ſeed for a few hours in water, and then on preſſing it we ſhall ſee ſmall bubbles of air or water iſſue from it.

3d. The CORCULUM, or Embryo. This may be conſidered as the eſſence of the ſeed or embryo of the future plant; that part which all the others ſerve only to defend and nouriſh. It is divided into two parts, the *plume* and *radicle*.

The *plume* is the upper part of the corculum; from its reſemblance to a feather, it has been called by Grew the plume, by Linnæus, *plumula*; it riſes upwards when the ſeed begins to vegetate, and forms all that part of the plant which appears above ground.

The *radicle* is the lower part of the corculum, which deſcends and forms the root of the plant. It has been called by Grew and other writers, the *radicle*; by Linnæus, it is called the *roſtellum*; but we prefer Grew's name, as being more expreſſive, and more eaſily retained in the memory; both the plume and radicle are remarkably conſpicuous in the French or kidney bean, the plume exhibiting the future leaves and even their fibres.

4th. The COTYLEDONS, or Lobes of the ſeed, make up the fourth part; they form the principal ſubſtance of the ſeed, incloſe, and for ſome time afford nouriſhment, to the corculum. In moſt plants they are two in number, as in the large garden bean, pea, &c. Some have one cotyledon only, as the graſſes, and ſome few are ſaid to have ſeveral cotyledons, though in fact theſe appear to have but two cotyledons, each of which is divided into ſeveral parts, as in the creſs. *Vide pl.* 3 & 4.

Plants whoſe ſeeds have one cotyledon only, are called monocotyledons; when they have two, dicotyledons; and when ſeveral, polycotyledons.

Their ſubſtance is generally compoſed of farinaceous matter, mixed with expreſſed or eſſential oil, and that often in a very conſiderable proportion, as in almonds and aniſeeds; the former by preſſure, the latter by diſtillation.

From the extremity of theſe cotyledons ariſe a number of very minute veſſels, which unite as they proceed towards the corculum, into which they enter in two diſtinct bodies. Being of the ſame colour as the other parts, their ramifications are not viſible on the flat ſurface of the cotyledons; we have a proof of their exiſtence however by a tranſverſe ſection; this is the only proof we have of their exiſtence, which indeed ſeems a ſufficient one. If the ſection be made at the extremity of the lobe, you may diſcern ſome very minute ſpecks; theſe, the nearer the ſection be made to the corculum, appear larger and fewer in number, till at laſt they ſeem to unite in one large branch, and enter the corculum; their delicate ſtructure prevents us altogether from unravelling them by maceration, or filling them by injection. If we examine a thin ſlice of a cotyledon with a large magnifier, it appears to be made up of a number of ſmall bladders.

Such then appears to be the ſtructure of the cotyledons, the farinaceous matter of which they are compoſed is the ſubſtance which is in ſuch general uſe in all countries for food; when ripe and dry, they are pretty eaſily reduced to powder; the huſk being of a different texture and more tough, is ſeparated in the bolting and ſifting, and forms the bran.

Having now examined the ſtructure of the ſeed, and ſhewn you all its component parts, we come to take notice of the alterations which it undergoes when placed in a ſituation adapted to make it vegetate.

SECTION IV.

On Vegetation.

IN order that a ſeed ſhould vegetate and produce a new plant, it is neceſſary in the firſt place that it be impregnated; ſecondly, that it be placed in a certain degree of heat, and ſupplied with a proper quantity of moiſture and air; theſe appear to be all that are neceſſary to ſet the *punctum vitæ*, or principle of life, in motion.

For the illuſtration of this ſubject we have choſen the Pea and Radiſh, as the proceſs of vegetation in moſt plants will be illuſtrated by theſe. *Vide pl.* 5 *&* 6.

After a pea has been placed in moiſt earth, in the ſummer time, for the ſpace of twelve hours, the whole bulk of it is conſiderably encreaſed, ſo as to make it take up twice the ſpace it did before; and from its increaſed weight as well as ſize, it is evident it has abſorbed a quantity of water: this water muſt have inſinuated itſelf either by the ſmall foramen we before ſhewed you, or through the coats of the ſeed. The radicle now becomes more prominent and apparent; in twenty-four hours more, the radicle has penetrated through the huſk, and paſſes downward into the earth; the plume ſoon afterwards makes its way from betwixt the cotyledons, where it lay incloſed, and riſes upwards. Hitherto the corculum has received all its nouriſhment from the cotyledons, it ſoon however leaves theſe for a more durable parent, the earth. The radicle as it deſcends, begins to throw out ſmall fibres, which increaſe, and draw nouriſhment from the earth; the plume riſes upwards and expands into leaves, the cotyledons having afforded nouriſhment to the corculum, till it is capable of ſhifting for itſelf, continues under ground and rots. *Vid. pl.* 5.

Such is the progreſs of vegetation in the pea and the ſeeds of the graſſes; but in the radiſh, and a great number of other ſeeds, a very different proceſs takes place. The cotyledons, which in the pea periſhed underground, and never appeared, in theſe are converted into real leaves, a circumſtance which paſſes unnoticed by moſt people; and did not daily obſervation prove it, we ſhould ſcarcely be perſuaded to think, that the thick, white, and ſolid ſubſtance of the cotyledons, is converted into green leaves: *Vid pl.* 6. theſe kind of leaves are called ſeminal leaves, and are of a different ſhape in different plants; their form however is little attended to, though capable of affording very good marks for diſtinguiſhing the ſpecies when other characters are wanting. *Vid. pl.* 3. & 4. They are always ſmooth, and of a different ſhape from thoſe into which the plumule expands; in ſome plants they quickly go off, in others they continue a long time, as in the radiſh. It is while the plant is in this ſtate that it is ſo liable to be deſtroyed by inſects. *Vid. pl.* 7.

The cotyledon leaves being ſmooth, tender, and ſweet, are eaten with great avidity by many inſects, and whole fields of turnips in this ſtate are frequently deſtroyed by a ſmall beetle, not much larger than a pin's head; if the plant is able to expand its plume, and come into rough leaf, as the farmers call it, they conſider the crop as ſafe.

Some have recommended ſoaking of the ſeeds in bitter and ſaline infuſions previous to their being ſown, in order to prevent the inſects from deſtroying them, but from the alteration which the lobes undergo, ſuppoſing them to be ſaturated with this infuſion before they are converted into cotyledon leaves, the effect of ſuch infuſions muſt be entirely deſtroyed; it is to be feared that a remedy for ſo deſtructive an evil can ſcarcely be found from any management of the ſeed previous to its being ſown, except where the egg of the inſect is already contained in the ſeed, which may ſometimes be the caſe.

It appears very evident, that during the progreſs of vegetation in many ſeeds, a degree of fermentation takes place, which converts the cotyledons into ſugar: in the ſeeds of the graſſes this is very apparent.

If we take a large heap of barley, ſoak it in water, and afterwards ſpread it on the floor, keeping it regularly turned over, that no part of it may be more heated than the reſt, in a day or two the radicle will ſhoot out at one end, and ſhortly after the plumule will appear at the other; if we take the barley in this ſtate and dry it on a kiln, we ſhall convert it into malt. And as a proof of its containing a greater quantity of ſugar than it did before, we have only to taſte it. Such is the theory of making malt; which is nothing more than converting the cotyledons of the barley into ſugar, by means of the fermentation which takes place during the vegetation of the ſeed.

This fermentation however cannot take place in ſo great a degree in all ſeeds; ſuch a change in its elementary parts would be quite incompatible with its appearing afterwards in the form of leaves, which the cotyledons in many ſeeds do, and which cannot therefore have ſuffered ſo great an alteration in their ſtructure.

Some ſeeds retain their vegetative powers much longer than others; parſnip and many other ſeeds will not vegetate if they have been kept more than a year, while others, particularly thoſe of the tetradynamia claſs, keep a very great length of time without injury; and there have been inſtances where ſeeds of this kind have been dug up after having been buried for a vaſt number of years, ſtill retaining their vegetative property.

After ſeeds have been placed in a proper ſituation, there is a great deal of difference with reſpect to the time of their beginning to vegetate; ſome ſpring in a day or two, as the graſſes, &c. others remain a year or two, as the nuts in general.

Moiſture and inſects are very deſtructive to ſeeds; whoever wiſhes either to keep or ſend ſeeds to any diſtance, ſhould be careful to ſecure them againſt theſe. Inſects will eat into and deſtroy the corculum, and even the cotyledons; and moiſture will occaſion a fermentation to take place, which will deſtroy its vegetative property, or make it vegetate before its proper time.

If the ſeeds then be quite ripe, perfectly dry, and wrapped up in paper, taking care that no inſects be incloſed with them, ſuch a proceſs it is preſumed will keep them in a ſtate of vegetation as long as encloſing them in wax, or any other tedious or formal proceſs whatever.

We ſhall finiſh this lecture by relating a fact relative to the expanſive power of the cotyledons mentioned by Dr. Haſſelquiſt, in his 'Iter Paleſtinum.'

He informs us, that the inhabitants who live near the banks of the river Nile, are frequently viſited in the night by the hippopotamus, or river horſe, a very large animal, which deſtroys and ravages their gardens and fields; in order to deſtroy this nightly viſitor, they place a large quantity of peas near his haunts, theſe he greedily devours, which ſwelling in his ſtomach, ſo diſtends it as to kill him.

Plate 2

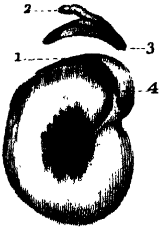


Fig 1.

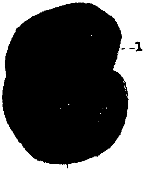


Fig 2

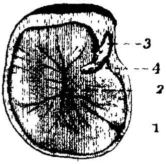


Fig 3

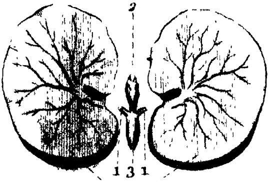


Fig 4

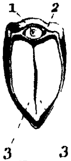


Fig 5

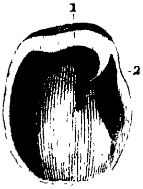


Fig 6.

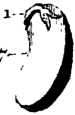


Fig. 7

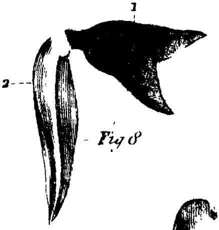


Fig 8

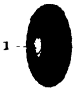


Fig 9

Fig 10.

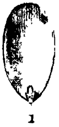


Fig 11

Publish'd by S. Curtis, Florist Walworth 1802 June 30

PLATE II.

ON SEEDS.

Fig. 1.—A Garden Bean in a green ſtate. 1. The hilum, or eye. 2. The footſtalk, or umbilical cord, by which it was connected to the pod. 3. The footſtalk dilated, ſo as to cover the hilum before their ſeparation. 4. The foramen or aperture at the extremity of the hilum.

Fig. 2.—The ſame ſtripped of its huſk. 1. Part of the radicle projecting beyond the cotyledons.

Fig. 3.—A Bean divided longitudinally down the middle. 1. The cutis or huſk. 2. One of the cotyledons within the huſk. 3 and 4. The corculum in its natural ſituation.

Fig. 4.—The two cotyledons divided, with their veſſels ariſing from the exterior edge, and which, ramifying, enter the corculum. 1 and 2. The plumule. 3. The radicle.

Fig. 5.—A tranſverſe ſection of a dry Bean, which ſhews how the radicle in Fig. 3.—3. is ſurrounded by the duplicature of the huſk. 1. The radicle. 2. The duplicature. 3. The cotyledons.

Fig. 6.—The Huſk of Fig. 3, with the cotyledon and corculum taken out of it. 1. Shews its greater thickneſs at the hilum. 2. The duplicature in its anterior part.

Fig. 7.—One of the cotyledons of a Kidney Bean, with the corculum. 1. In its natural ſituation.

Fig 8.—The corculum of the Kidney Bean magnified; the plumule 1. ſhewing the veins of the future leaves. 2. The radicle.

Fig. 9.—The Kidney Bean, in which the hilum 1. is ſituated in the middle of the ſeed.

Fig. 10.—The Kernel of a Filbert.

Fig. 11.—Half of the ſame, or one of the cotyledons in which the corculum is ſituated at the point 1.

Plate. 1

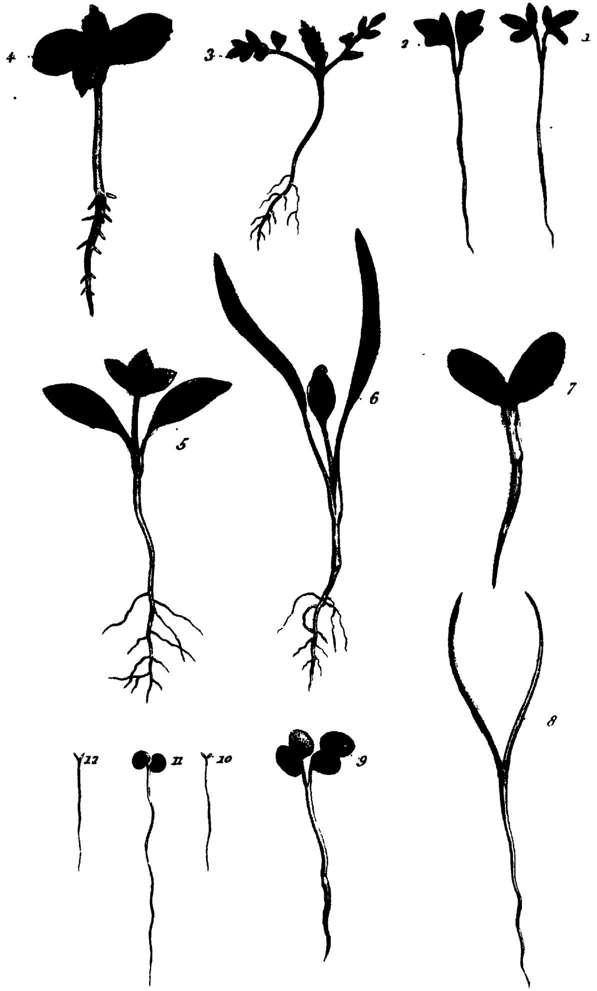


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PLATE III.

ON SEED-LEAVES,

This Plate is illuſtrative of the difference of the ſeminal leaves in different plants; .that is, the form which the cotyledons of different ſeeds aſſume in the progreſs of vegetation. Thus 1, which appears to have ſeveral cotyledons, in fact has but two, each of which is cleft into three parts, and placed on a footſtalk. 2. Shews the ſame kind of diviſion, but not ſo deeply cleft. 3. Is pinnated into many leaflets. 4. Is more ſimple, the future leaves becoming dentated. 5. Simple and future leaved trifidum. 6. Remarkably long. 7. The moſt ſimple, and generally thick, as the kernels of many fruits. 8. Remarkably long and ſlender. 9. Appears to have four cotyledons, but in fact there are but two, each of which is ſlightly cleft and grooved from the baſe to the apex. 10, 11, and 12, Are very ſimple and minute; the radicle in theſe make a more rapid advancement than the plume, till they begin to throw out their future leaves.

Plate

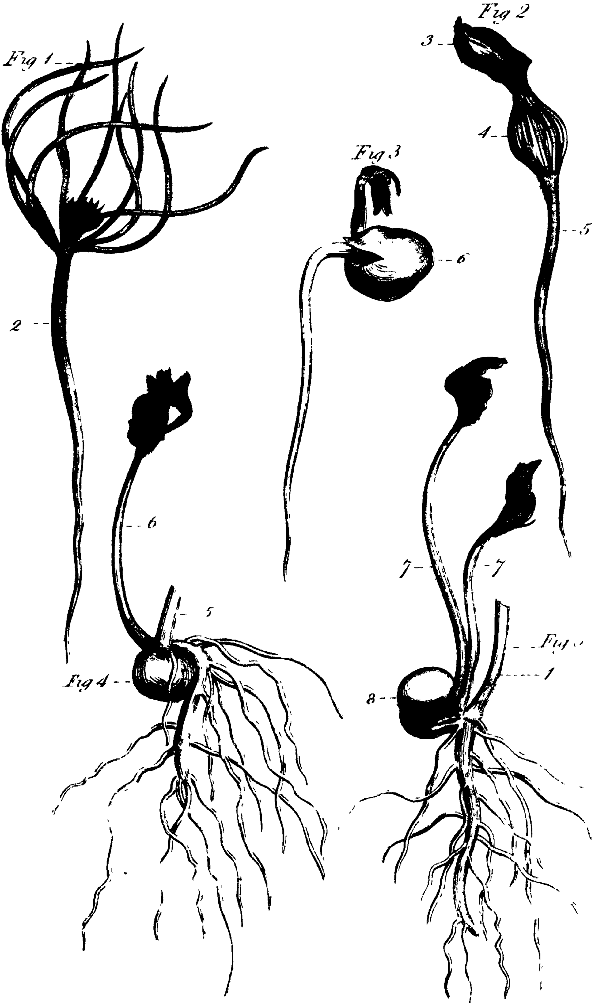

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PLATE IV.

ON SEED-LEAVES, &c.

Fig. 1.—Shewing an inſtance of polycotyledons in the fir. 2. The radicle not yet beginning to put forth fibres.

Fig. 2.—3. The huſk of the ſeed leaving the cotyledons. 4. The cotyledons now become ſeminal leaves. 5. The radicle.

Fig. 3.—A Pea in the ſtate of vegetation, the plumule riſing upward. 6. The ſeed which periſhes under ground. Vid. Plate 5.

Fig. 4.—A Pea, which having vegetated, the plumule in the ſtate of Fig. 3, was cut off 5. When it produced another, 6.

Fig. 5.—Another Pea, whoſe plumule had been cut off, produced two others, 7. The Pea, 8. From nine Peas having their plumules cut off, five of them produced two new ones each, and the other four, one each. Query whether the two in general would be more productive than the original one.

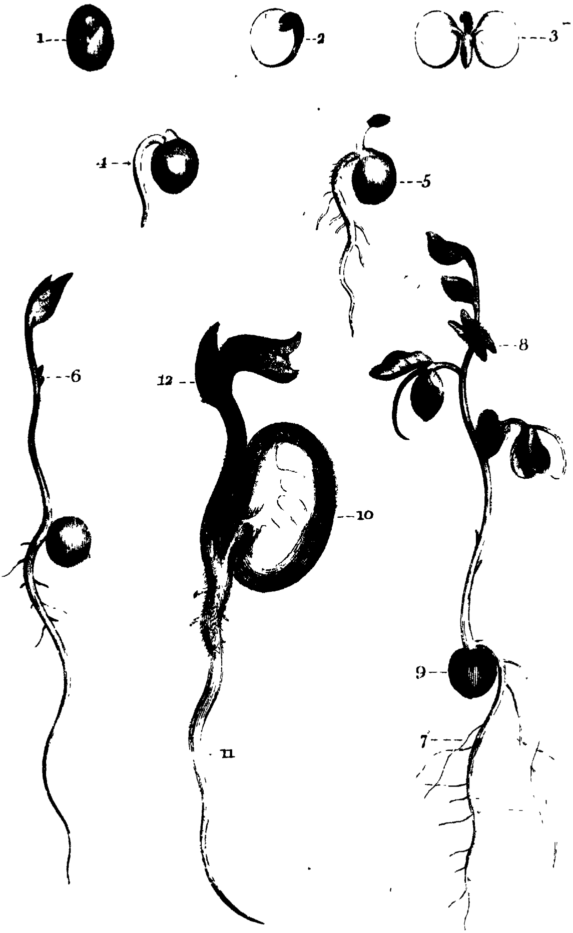

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PLATE V.

ON THE PROGRESS OF VEGETATION

IN THE PEA, &c.

1.—A Pea, which, having been placed in moiſt earth, is juſt ready to vegetate.

2.—One of the cotyledons, with the corculum in its natural ſituation.

3.—The cotyledons opened, ſhewing the corculum betwixt them, and the manner in which it is connected to them.

4.—The radicle ſhooting downwards, being the firſt obvious appearance of vegetation.

5.—The vegetation further advanced, the radicle having ſhot down deeper, and beginning to put forth fibres, the plumule riſing upwards, and juſt appearing above ground.

6.—The plumule further advanced.

7.—The radicle now beginning to puſh forth numerous fibres.

8.—The plumule expanded into leaves.

9.—The Pea continuing under-ground, where the cotyledons periſh.

10.—A Garden Bean in a ſtate of vegetation.

11.—The radicle putting forth fibres.

12.—The plumule expanding into leaves.

Plate 6

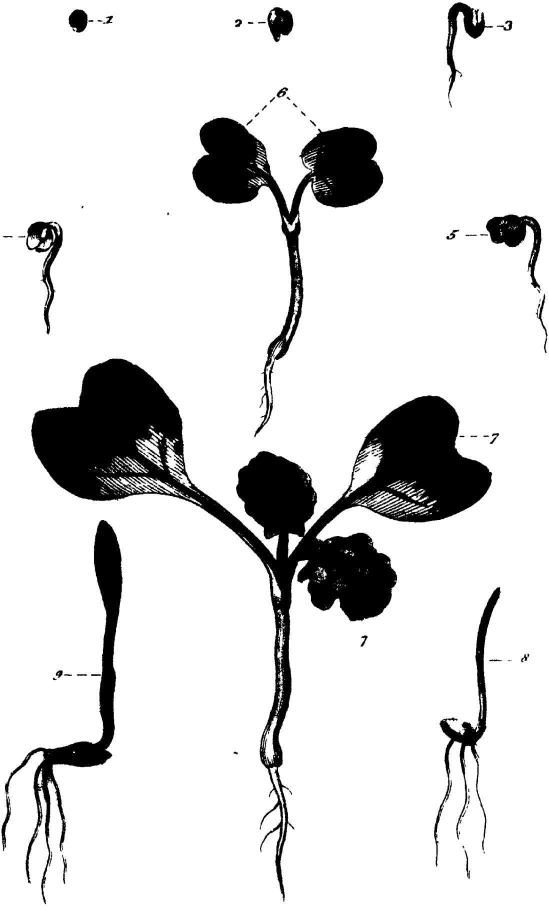

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PLATE VI.

ON THE PROGRESS OF VEGETATION

IN THE RADISH.

Fig. 1.—The radicle juſt breaking through the cutis or huſk.

Fig. 2.—The radicle puſhing downwards; the huſk burſt ſo as to ſhew a little of the cotyledons.

Fig. 3.—The radicle further advanced, the huſk more opened, and the cotyledons more viſible.

Fig. 4.—The huſk ready to drop off, the cotyledons ſtill yellow, but beginning to aſſume the appearance of leaves.

Fig. 5.—The huſk dropped off, the cotyledons now more like leaves, juſt riſing above ground.

Fig. 6.—The cotyledons in the form of green leaves, as they firſt appear above ground, as yet without the appearance of the plumule.

Fig. 7.—The cotyledons or ſeed leaves grown larger, with the plumule 7, now conſiderably advanced, riſing up betwixt them.

Fig. 8.—Wheat in a ſtate of vegetation, the radicle and plumule ſpringing from the ſame end.

Fig. 9.—Barley in a ſtate of vegetation, the radicle and plumule apparently ſpringing at oppoſite ends, though in fact, the plumule only paſſes along under the huſk.

Plate 7

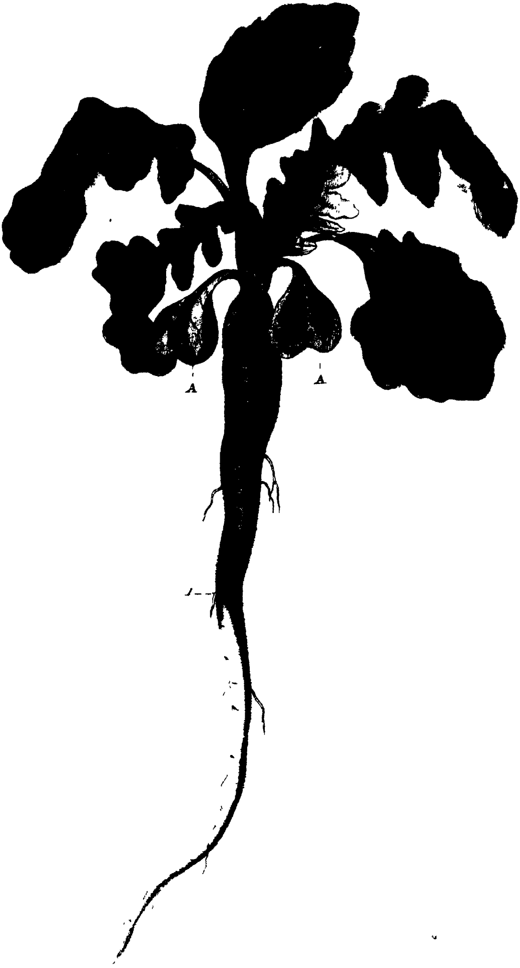

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PLATE VII.

CONTINUATION OF THE PROGRESS OF VEGETATION

IN THE RADISH.

Fig. 1.—The cotyledons of the ſeed which are converted into green leaves ſtill retained on the Radiſh at its full growth; illuſtrating the difference between this and the Pea, &c. in which the cotyledons periſh under ground.

SECTION V.

On Seed-veſſels.

WE have already ſhewn you the ſtructure of the ſeed, and the manner in which it vegetates; we come now to ſhew you the ſtructure of the veſſels, or caſes which contain the ſeeds, and the ſeveral methods which nature, in her wonderful economy, makes uſe of in her diſtribution of them.

In ſome plants the ſeeds are not contained within any kind of ſeed-veſſel, but fixed to the end of the flower ſtalks, or receptacle, as in Leontodon or Dandelion, where they remain till ripe, and then drop off, or are blown off by the wind, as in the umbelliferous plants, and thoſe of the claſs ſyngeneſia.

In ſome plants the ſeeds have no other ſeed-veſſels than what the calyx affords; in the bottom of which they are contained, as in the plants of the claſs and order didynamia gymnoſpermia: here the calyx continues without ſuffering any alteration, but in ſome other plants the calyx expands when the plant is in flower, and afterwards cloſes on the ſeed, and ſecures it till ripe, as in the Rumex or Dock.

But the ſeeds in the generality of plants are incloſed within a pericarpium or ſeed-veſſel, which in different plants is variouſly conſtructed, and according to its diverſity of ſtructure, acquires different appellations. Linnæus enumerates eight different kinds, viz.

CAPSULA, SILIQUA, LEGUMEN, FOLLI-

CULUS, DRUPA, POMUM, BACCA, and STROBILUS.

1ſt. CAPSULA.—The Capſule is the moſt common kind of ſeed-veſſel, and is defined to be a dry hollow ſeed-veſſel, which ſplits or opens in ſome determinate manner.

A Capſule conſiſts of ſeveral different parts, each of the pieces into which a ſeed-veſſel ſplits or divides, is called a valve; if it ſplit into two, it is called bivalvis; into three, trivalvis, and ſo on.

The cavity of the capſule is called *loculamentum*. If a capſule conſiſt of one cavity or cell, it is called *unilocularis*, one-celled; of two, *bilocularis*, two-celled; of three, *trilocularis*, three-celled; and ſo on. Vid. *Plate* 8.

A Capſule conſiſting of three cells, each of which has in it a ſingle ſeed, is called Capſula Tricocca.

Capſules differ much with reſpect to the manner in which they open; they generally ſplit into as many pieces or valves, as they have cavities; if they have only one cavity, it opens for the moſt part at top, as in the Lychnis, Poppy, and Ceraſtium; ſometimes at the ſides, as in the Caltha; ſometimes at the bottom, as in the Campanula; in ſome few the Capſule divides horizontally near the middle, as in the Pimpernel; this kind of Capſule is called Circumſciſſa. In ſome kinds of Capſules the valves are endowed with an elaſtic quality, by which means the ſeeds are thrown to a conſiderable diſtance, as in the Impatiens Noli me tangere.

Capſules differ exceedingly with reſpect to their form, as well as their ſurface, thus we find them round, oval, long, three cornered, jointed, &c.; ſome ſmooth, others prickly; remarkable inſtances of this occur in the poppy, the ſpecies of which are chiefly diſtinguiſhed by the ſmoothneſs or roughneſs of the capſules.

2d. SILIQUA is a ſeed-veſſel having two valves, in which the ſeeds are fixed to both ſutures.

3d. LEGUMEN, a ſeed-veſſel of two valves, in which the ſeeds are fixed to one ſuture only.

4th. FOLLICULUS, a ſeed-veſſel of one valve, opening from top to bottom on one ſide, the ſeeds being attached to a receptacle within it, not to any ſuture.

5th. DRUPA, a ſeed-veſſel which is ſucculent or pulpy, having no external opening or valve, containing within its ſubſtance a ſtone or nut.

6th. POMUM, a fleſhy ſeed-veſſel, without any external opening or valve, containing within its ſubſtance a capſule.

7th. BACCA, a pulpy ſeed-veſſel, containing within its ſubſtance a number of naked ſeeds.

8th. STROBILUS, or Cone, a ſpecies of ſeed-veſſel compoſed of woody ſcales, within which lie the ſeeds.

Such then are the different kinds of ſeed-veſſels; we ſhall now make a few remarks on the ſeeds.

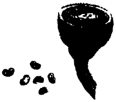
With reſpect to number, plants are either furniſhed with one ſeed to each flower, as in Biſtort, Dock, &c. With two, as in the umbelliferous plants; three, as in Euphorbia; four, as in the Didynamous plants; numerous, as in the Poppy. The fertility of ſome plants with reſpect to their number of ſeeds, is truly aſtoniſhing. Inſtances of this kind are afforded in the Poppy, Tobacco, Orchis, Ferns, and Moſſes.

Mr. Ray, from experiments made by himſelf, eſtimates the annual produce of the ſeeds of a ſingle leaf of the ſpleen-wort to be upwards of a million.

The form of the ſeeds, as well as of the ſeed-veſſels, is extremely various, the appearance of ſome exceedingly curious and beautiful; the ſeeds of moſt of the compound flowers are furniſhed with a pappus or down, when this is placed immediately on the crown of the ſeed, it is called *ſeſſilis*; when placed on a footſtalk, *ſtipitatus*; when the pappus conſiſts of ſimple rays, it is called *ſimplex*, as in Sowthiſtle; when branched or feathered as in Goat's-beard, *plumoſus*; this is evidently intended for their diſſemination; others are furniſhed with little hooks, as in the genus

Caucalus; ſome have their ſurfaces reticulated like a honey-comb; ſome are perfectly ſmooth and poliſhed; ſome gloſſy, as if varniſhed, as the Biſtort; others deeply grooved; ſome perfectly round; others kidney-ſhaped; others flat; others three-cornered; ſome furniſhed with wings, as the Maple, and ſome of the umbelliferous plants; in ſhort the ſeeds afford a large field of contemplation for the philoſophic botaniſt.

The great variety of ways which nature has provided for their diſſemination, is no leſs worthy of our notice; ſome are carried along by rivers and torrents, and frequently conveyed many hundred miles from their native ſoil, and though into very different climates to thoſe which gave them birth, yet to which by degrees they become familiarized. Thoſe that are carried by the wind are either winged, as in Birch, and ſome of the umbelliferous plants, or furniſhed with a pappus or down, which we have ſhewn you, as in dandelion, goats-beard, and valerian. Some ſeeds are placed within a winged calyx, as in ſcabious, or contained within an inflated ſeed-veſſel, as in bladder-ſenna. Some birds ſwallow the ſeeds and afterwards void them entire, frequently on trees, where they grow, as in miſletoe; ſome attach themſelves to animals by means of little hooks, which are either fixed to the ſeeds themſelves, as in clivers, or make a part of the calyx, as in burdock. Some are thrown out of the ſeed-veſſels, by means of the elaſticity of the valves, as impatiens; others by an elaſtic ſubſtance immediately ſurrounding the ſeed, as wood-ſorrel, or by an elaſtic ring ſurrounding the capſula, as in the ferns. In ſhort, the various means which nature makes uſe of in their diſſemination, ſhew how ſolicitous ſhe has been for preſerving the ſpecies.



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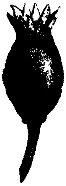

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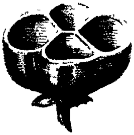

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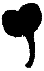

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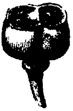
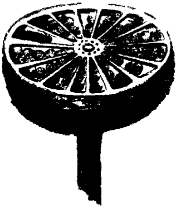


Fig 2

Fig 6



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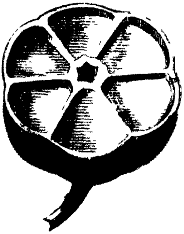

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PLATE VIII.

PERICARPIUM.

CAPSULA.

Fig. 1.—Unilocularis, having but one cell.
Fig. 2.—Bilocularis, having two cells.
Fig. 3.—Trilocularis, having three cells.
Fig. 4.—Quatrilocularis, having four cells.
Fig. 5.—Sexlocularis, having ſix cells.
Fig. 6.—Multilocularis, having many cells.

Plate 9

Fig 2

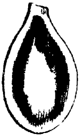

Fig 4

Fig 1

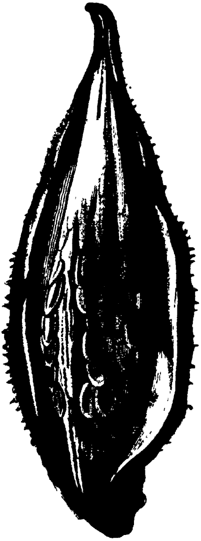

Fig 3

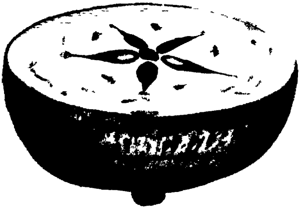

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PLATE IX.

PERICARPIUM.

Fig. 1.—Pericarpium Folliculus, a ſeed-veſſel of one valve, opening from top to bottom on one ſide, the ſeeds being attached to a receptacle within it, not to any ſuture.

Fig. 2.—A ſeed magnified.

Example.

Aſclepias Synaca.

Fig. 3.—Pericarpium Pomum; a fleſhy ſeed-veſſel without any external opening or valve, containing within its ſubſtance a capſule.

Fig. 4.—A ſeed from the ſame.

Example.

Apple.

Plate .

Fig 1

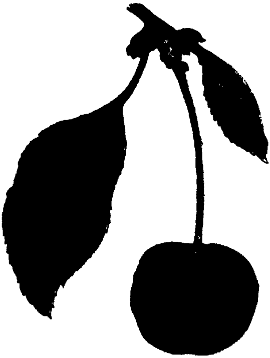
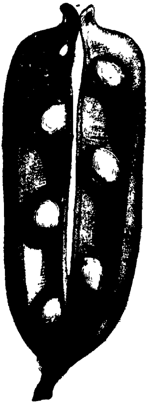


Fig 4



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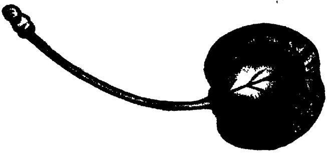

Fig 3

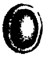

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PLATE X.

PERICARPIUM.

Fig. 1.—Pericarpium Drupa; a ſeed-veſſel which is ſucculent or pulpy, having no external opening or valve, containing within its ſubſtance a ſtone or nut, as in Fig. 2. A tranſverſe ſection of the ſame, Fig. 3.

Example.

Cherry.

Fig. 4.—Pericarpium Legumen; a ſeed-veſſel in which the ſeeds are fixed to one ſuture only.

Example.

Pea.

Plate 11

Fig 1

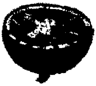


Fig 2

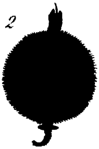
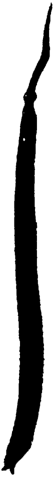


Fig 3

Fig 4



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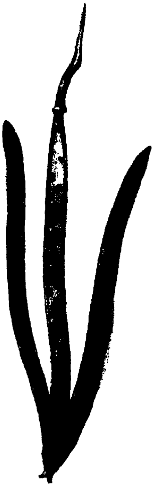

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PLATE XI.

PERICARPIUM.

Fig. 1.—Pericarpium Bacca; a pulpy ſeed-veſſel, containing within its ſubſtance a number of naked ſeeds.

Fig. 2.—A whole ſeed-veſſel of the ſame.

Example.

Gooſeberry.

Fig. 3.—Pericarpium Strobilus, a cone; a ſpecies of ſeed-veſſel compoſed of woody ſcales, between which lie the ſeeds.

Example.

Fir Cone.

Fig. 4—Pericarpium Siliqua; a ſeed-veſſel having two valves, in which the ſeeds are fixed to both ſutures.

Fig. 5.—The ſame opened to ſhew the ſeeds.

Example.

Wall Flower.

SECTION VI.

On Roots.

HAVING given you an idea of the ſeeds, the veſſels which incloſe them, and the proceſs by which vegetation forms the future plant, in the next place we ſhall begin at the Root, and trace the plant to its full growth.

The root is generally underſtood to be that part of the plant which is under-ground, and which draws forth nouriſhment from the earth neceſſary for the exiſtence of the plant.

Linnæus, in treating on roots, conſiders all that lies below the branches, roots, and terms the ſtem the *aſcending caudex*; how far it may be proper to adopt the ſame plan we ſhall leave, but to illuſtrate the intention of theſe lectures we ſhall be much better underſtood, and the ſcience more ſimplified, in adhering to the moſt general acceptation of the word. The body of the root, or that which lies below the ſurface of the earth, he terms the *deſcending caudex*, the fibrous part of the root is termed the Radicula, which imbibes the nouriſhment from the earth for the ſupport of the whole plant.

The root, like the ſtalk, conſiſts of *Cortex*, the outer covering of all; *Liber*, the inner bark; *Lignum*, the wood; and *Medulla*, the Pith.—*Vid. Sect. 7. on Stalks.*

The root in duration is *Annua*, annual, living but one year; *Biennis*, biennial, a root which continues to vegetate two years; or *Perennis*, perennial, continuing ſeveral years.

Roots in figure are various, and from their different ſhape acquire different appellations, as fibroſa, premorſa, granulata, tunicata, fuſiformis, ſubrotunda, tuberoſa, ſolida, ſquamoſa, &c. for an illuſtration of which, vide plates annexed.

A knowledge of roots is very neceſſary, not only to the gardiner, but alſo to the agriculturiſt, and from the extenſive uſe they are of in medicine, the medical ſtudent will always do well in examining plants, to examine their roots likewiſe, as he may have opportunities of detecting wrong ones amongſt thoſe he may have occaſion to uſe; nevertheleſs it is not from the root in general that we are to decide on its utility, either in medicine or for culinary uſes, the parts of fructification being in general the moſt certain criterions.

Thus we find that moſt of the night-ſhades are more or leſs poiſonous, and even potatoes are not perfectly free from this quality, although they contain it in ſo ſlight a degree as not to be prejudicial to the conſtitution; quere, whether ſuch as grow on the top of the ground, or rather ſwell to the ſurface, and by expoſure to the light and air become green, which green colour is not ſuperficial, but goes conſiderably into the potatoe, are not more ſo than the others? They have an acrid or rather a copperas taſte, acquired by expoſure to the air: ſome of the other night-ſhades are exceedingly poiſonous, and if taken in any conſiderable quantities produce delirium, and even death.

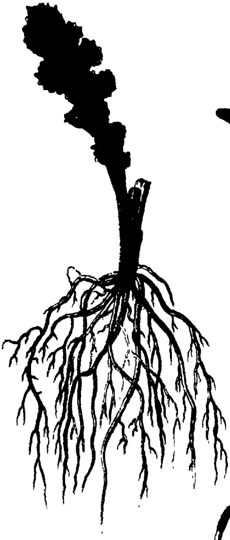
Plants of the claſs Hexandria, have many of them roots of a very pungent and acrimonious taſte, which are nevertheleſs wholeſome and agreeable when roaſted or boiled, as onion, &c. The roots of the martagon and tulip are alſo eaten in ſome parts as common food.

Roots of plants of the claſs Didynamia Gymnoſpermia, are ſeldom or never uſed either in medicine or economical purpoſes; plants of tetradynamia claſs are ſome of them very acrid, as horſe-radiſh, but no plant in the whole claſs is poiſonous, nor is there in the roots of plants of the claſs and order monadelphia polyandria, but on the contrary they are emollient and lubricating, inſtances of which are afforded in both the common and marſh mallows; the ſame quality of obtunding acrimony is obſervable not only in the root, but in every other part of the plant.

In fact, till the claſs and order of a plant or root can be aſcertained by its fructification, the ſmell or taſte ſhould not quite be depended upon, although they are the moſt natural criterions, thus a horſe will graze with ſafety amidſt noxious and ſalutary plants, and ſhould he meet with the phellandrium aquaticum, or common water hemlock, he will, by his ſmell or taſte, avoid it as poiſonous, while a cow, to whoſe ſenſe of ſmell and taſte it is agreeable, will eat it, and to her it proves wholeſome. This ſhews that what is ſalutary to one ſet of our organs, either thoſe of ſmelling or taſting, may be ſo to the reſt; ſtill new things that have not been aſcertained, are not to be truſted to too great an extent at firſt, but tried with caution, for want of which practitioners in medicine have ſometimes erred, to the danger of the lives of their patients; this may happen from a too great eagerneſs to bring in plants to the aid of medicine from amongſt the moſt powerful and poiſonous ones, which certainly requires the greateſt caution and ſkill of the moſt able of the faculty. The determining of plants by the ſmell or taſte, whether they are noxious or ſalutary, opens at once an extenſive field of contemplation and wonder for man to ſee the goodneſs of a ſuperior Being to every part of his creation, and ſhews why one herb was made more noxious than another to the ſame animal, for if all were ſalutary alike, one animal would deprive another of ſubſiſtence; whereas at preſent they muſt not eat of thoſe which do not accord with their ſenſe of ſmelling or taſting, on pain of ſickneſs, or perhaps death.

Plate

1



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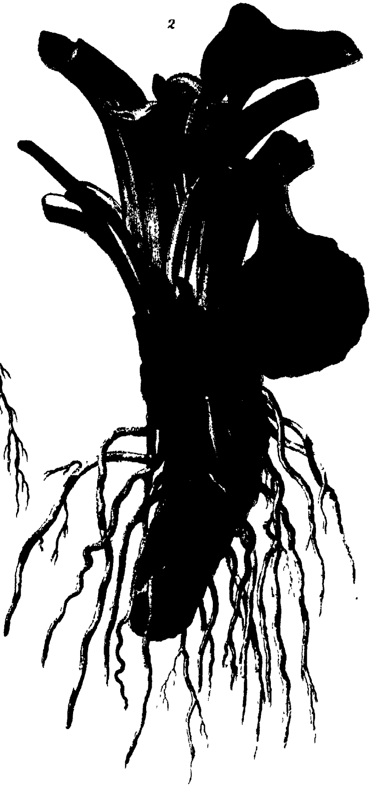

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PLATE XII.

ON ROOTS.

Fig. 1.—Radix Fibrous, a root which has no ſolid body, but is made up entirely of thread-like fibres.

Example.

Common Groundſel.

Fig. 2.—Radix Præmorſa; a root which does not run tapering to its extremity, but appears bitten off.

Example.

Plantain.

Plate 13

Fig 1

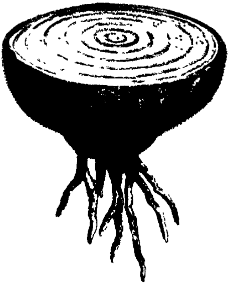


Fig 2

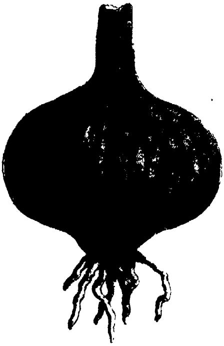
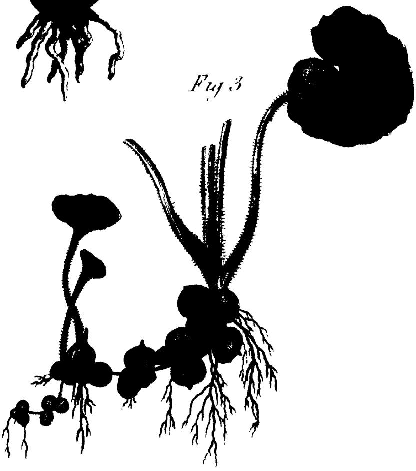


Fig 3



[illegible] St Carlos Place [illegible] May 31 1802 [illegible] Sanſom sculp

PLATE XIII.

ON ROOTS.

Fig. 1.—Radix Tunicatus; a tranſverſe ſection of a root conſiſting of many coats, each forming a concentric layer, oppoſed to ſquamoſa, which ſee.

Fig. 2.—The whole bulb.

Example.

Onion.

Fig. 3.—Radix Granulata; a granulated root, conſiſting of ſmall knobs attached to the root by ſmall fibres, ſame as aggregata.

Example.

Saxifraga Granulata.

1

2

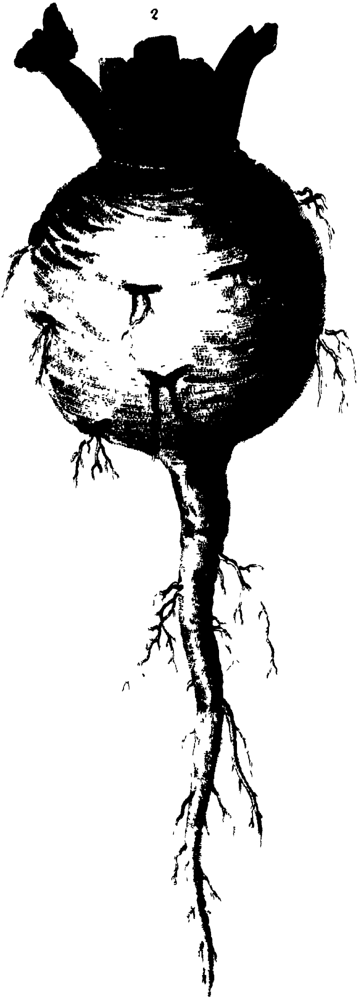


PLATE XIV.

ON ROOTS.

Fig. 1.—Radix Subrotunda; a root which is nearly round.

Example.

Turnip.

Fig. 2.—Radix Fuſiformis; a root which tapers downwards to a point, ſpindle-ſhaped.

Example.

Carrot.

Plate 15 X.

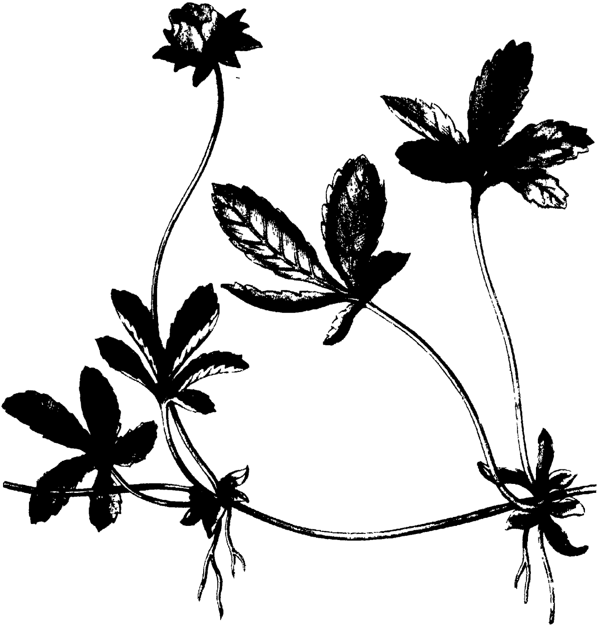


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PLATE XV. ✠

ON ROOTS.

This, though apparently fibrous, is fuſiform when older, furniſhed with but few fibres; the ſtalks running on the ſurface of the ground, take root at the joints, by which method the plants increaſe, but widely differ from the Radix Repens, which ſee.

Example.

Potentilla Reptans.

Plat

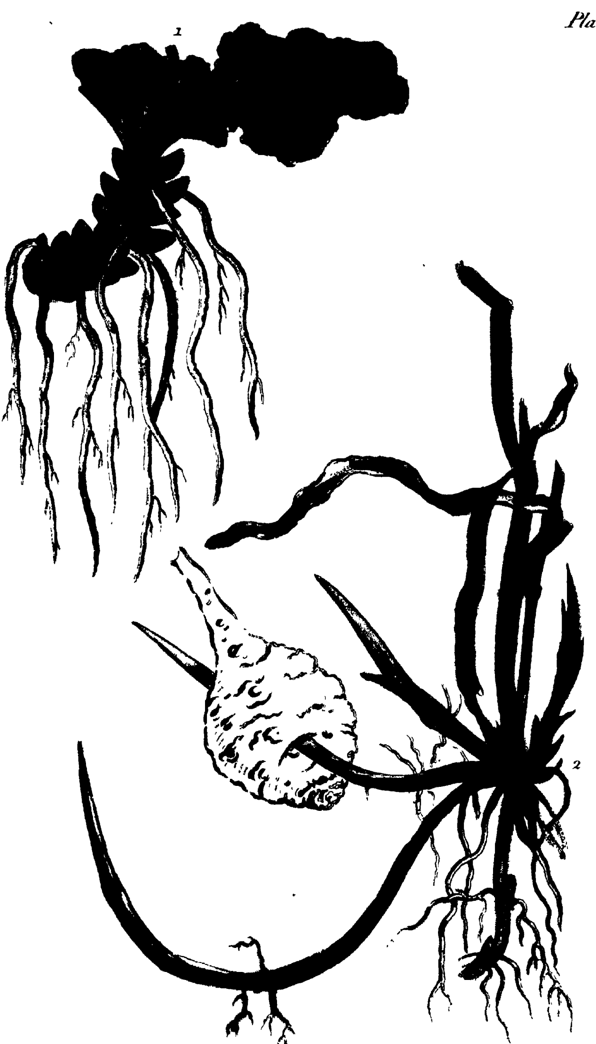

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PLATE XVI.

ON ROOTS.

Fig. 1.—Radix Dentata; a root having many tooth-like knobs, differing from granulata in the ſhape of the knobs, and not being attached to the body of the root by means of a fibre as it is.

Example.

Primulæ.

Fig. 2.—Rad. Repens, a creeping root, extending horizontally under ground, and ſending forth ſhoots from the joints; ſome roots have ſuch progreſſive power, as to pierce any ſubſtance ſofter than wood, and will go through a potatoe, or Jeruſalem artichoke; the outline of one in that ſtate being here repreſented.

Example.

Couch Graſs.

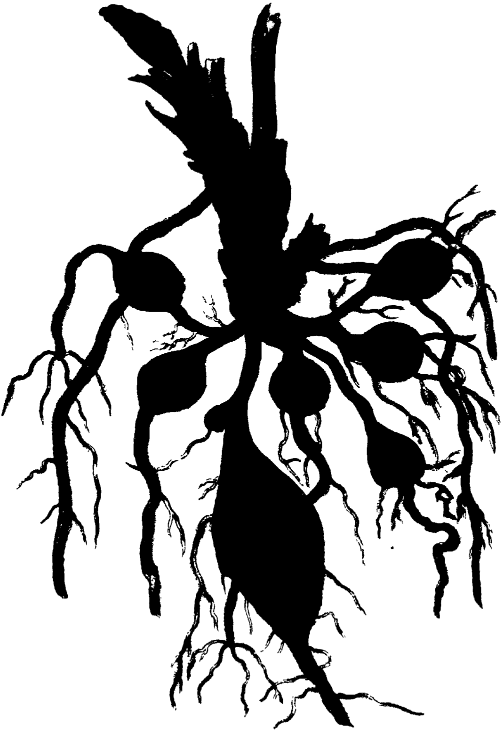

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PLATE XVI. ✠

ON ROOTS.

Radix Tuberoſa; a root conſiſting of ſubrotund bodies, collected into a bundle, from Tuber, a knob or knobbed root; of theſe there are three kinds, viz. palmata, faſciculata and pendula.

Palmata, when it ſpreads in ſuch a manner as to reſemble a hand.

Faſciculata, when a quantity of tubera or knobs are collected into a bundle.

Pendula, a ſpecies of tuberoſa, where the knobs hang down.

Example.

Peony.

Plate .

Fig 1

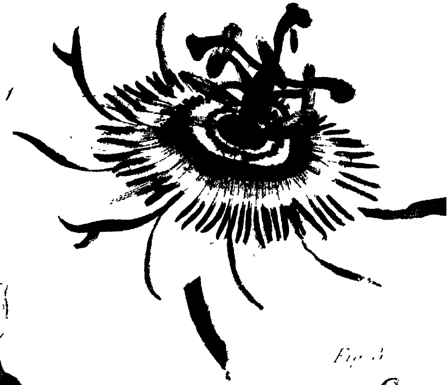

Fig 2

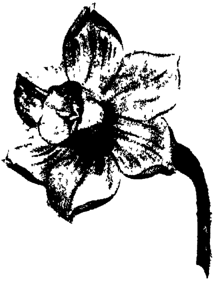

Fig 3

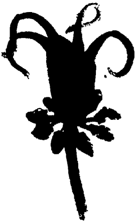

Fig 4

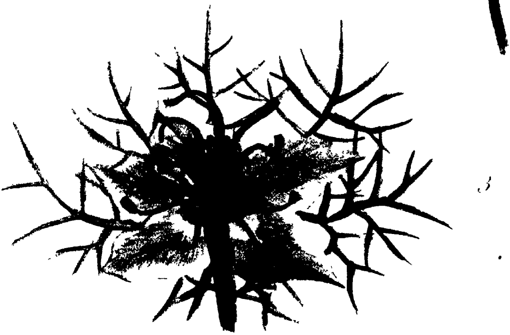

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PLATE XVII.

ON THE PARTS OF FRUCTIFICATION.

On the Nectarium.

Fig. 1.—Nectarium in the Paſſion Flower, in form of threads. 1.

Fig. 2.—Nectarium in the Narciſſus, appearing like a continuation of the Corolla. 1.

Fig. 3.—Nectarium in the Nigella. 2.

Fig. 4.—A perfect Flower of the ſame. 3.

SECTION VII.

On Stalks.

THE ſeveral parts into which the plumule expands itſelf, are much more numerous than thoſe into which the root divides, or in other words, there is a much more conſiderable apparatus for encreaſing a plant by its ſeeds than its roots.

In annual roots, ſtrictly ſo called, the apparatus is extremely ſimple, conſiſting of nothing more than the fibres neceſſary to draw forth nouriſhment from the earth; but in many perennial roots, a proviſion is not only made for the preſent growth of the plant, but alſo for its future increaſe, and this is effected by the production of bulbs, or tubera, which contain in them one or more embryos, or future plants; thus we compare a potatoe to a large ſeed, having many corcula or embryos, which like real ſeed, require only to be placed in a proper ſituation to make them vegetate.—*Vid. plate* 18. ✠

Annual plants are generally much quicker in producing their ſeeds than perennials, indeed perennial plants, in certain ſituations, produce no ſeeds at all; thus many of the graſſes, when growing on the tops of very high mountains, where cold and moiſture predominate, become viviparous, that is, the panicle inſtead of producing ſeeds, throws out ſhoots of graſs, which from their weight falling to the ground, ſtrike root, and ſo the plant is increaſed.—*Vid. plate* 19. ✠

Such graſſes on being introduced into the garden, are apt in a few years to loſe their viviparous quality, or a plant may be introduced into a climate where the winter may ſet in ſo ſoon as to prevent it from ſeeding, which is exactly the caſe with the Jeruſalem artichoke, and many of the aſters, and which conſequently never produce ſeeds with us, yet there are few plants in a garden which increaſe by their roots to the ſame degree. It often happens indeed, where nature has given great powers of increaſe to the root of a plant, ſhe has not been ſo ſolicitous about its perfecting its ſeeds, as in the butterbur, &c. There are ſome inſtances, but thoſe indeed are very rare, in which plants appear to be all root, if roots they may be called, as in the lycoperdon, tuber or truffle, which never produce any thing like either ſtalk or leaf, and which therefore affording no certain marks of diſcovery, are hunted up by dogs bred up to the buſineſs.

But for the moſt part the roots throw up a ſtalk which finally produces both flower and fruit. We find by experience that the root and the herb reciprocally aſſiſt each other. If we cut down the ſtalk of a perennial plant, it will generally throw out new ones, but by continuing the operation the root is ultimately deſtroyed, for the root can no more exiſt without the herb, than the herb can without the root, yet there are ſome plants which are not ſo ſoon deſtroyed by this operation as others.

In ſpeaking of the vegetation of the ſeed, we obſerved that the corculum as it unfolded, produced the radicle and plumule, that the radicle ſhooting downward, became the root, while the plumule riſing upward, became the ſtalk. It is in this way that the ſtalk is primarily produced, and continues to be produced in annual plants. In herbaceous perennial plants, where the ſtalk yearly decays, the root annually throws up a new one, the ſtalk therefore may originate either from a ſeed or from a root.

The ſtalk in its ſtructure, is very ſimilar to the root, ſo much ſo indeed, that Linnæus has conſidered the ſtalk as a root above ground; without entering very minutely into its ſtructure, we find it to conſiſt of the

Cortex, or outer bark, covered by its cuticle, a continuation of which forms the future calyx.

Liber, or inner bark, a continuation of which forms the corrolla.

Alburnum or ſap, a ſoft white ſubſtance found between the liber or inner bark, and the wood, and which in proceſs of time, requiring ſolidity, becomes the wood itſelf; to the generation of this ſubſtance, the tree is ſuppoſed to owe its annual increaſe.

Lignum, the wood in the centre of which is the Medulla, or pith.

The Medulla is largeſt in the young ſhoots of trees; as the trees grow old it diſappears entirely. Elder is well known to have a large quantity of medulla; elm, oak, pear, and apple, have ſcarcely any; guaiacum, ebony, and iron wood, none at all.

Though the ſtructure of plants is difficult to unravel, yet experiments made by divers perſons prove that they are chiefly compoſed of tubes and cells, which are infinitely various, ſome of theſe tubes convey air, and theſe have often been found to aſſume a ſpiral form, others the ſap, and others the proper juices of the plant, which is often coloured; in the ſpurge we find it white, as well as in many of thoſe plants which have compound flowers, as lettuce, dandelion, &c. and which from this circumſtance, have been called lacteſcent: in the celandine it is yellow. The veſſels of plants do not appear to have the ſame kind of ſtructure as the blood-veſſels of animals, but go on in a more ſtraight direction, and uſually terminate in a cell or cavity; but though they have not the ſame communication as veins and arteries, yet it is evident they have ſome kind of communication, for if we cut a notch in a ſtem more than half way through, and a little way up on the oppoſite ſide cut another notch equally deep, the circulation will nevertheleſs be carried on through that ſtem.

Stalks vary much in their manner of growth, and frequently form exceeding good ſpecific characters.

Linnæus enumerates four kinds of ſtalks, viz. CAULIS, CULMUS, SCAPUS, and STIPES.

CAULIS, is that kind of ſtalk which ſupports both the fructification and leaves, and is common to plants in general.

CULMUS, or Straw, a kind of ſtalk peculiar to the graſſes.

SCAPUS, a kind of ſtalk which ſupports the fructification, but not the leaves.

STIPES, a kind of ſtalk peculiar to the fungi. It is alſo uſed by Linnæus to ſignify the ſtalk of the ferns. Stalks, according to their durability, acquire different names; thus when it dies down to the root yearly, it is called *herbaceous*; whether it be from an annual or perennial root. If it continues through the winter, and produces buds, it is called *fruticoſus*, or *arboreus*, ſhrubby, or woody, for they appear to differ in ſize only.

Stalks vary alſo in a variety of other particulars, all of which are enumerated and deſcribed by Linnæus; we ſhall point out to you ſome of the moſt remarkable, or ſuch as moſt frequently occur.

ACULEATUS; beſet with ſharp prickles, as in Sweet Briar.

ANCEPS; two-edged, forming two angles oppoſite each other, as in Siſyrinchium.

ANGULATUS; angulated, as in Convallaria Polygonum.

COMPRESSUS; compreſſed on oppoſite ſides, the tranſverſe ſection forming an ellipſis, as in the Poa Compreſſa.

ERECTUS; erect, upright, perpendicular.

FISTULOSUS; tubular, a hollow ſtem, as in Hemlock.

FOLIOSUS; covered with leaves, as in Lily, Gladiolus.

HISPIDUS; covered with briſtles or prickles, which are only ſuperficially rooted, ſo as to ſtrip off with the rind, as in Bryony.

INANIS; ſpungy or pithy, neither ſolid nor tubular, as in Bella Donna.

NUDUS; naked, without leaves or branches, as in Cowſlip.

PROCUMBENS; lying horizontally along the ground, but not ſhooting out *radiculæ* from the joints, as in Repens; Convolvulus; Soldanella.

PUBESCENS; downy, hairy, as in Deadly Nightſhade.

RAMOSISSIMUS; abounding with branches irregularly diſpoſed.

RAMOSUS; having many branches, but not in ſo great an abundance as the former. The branches of the ſtalk are called *rami*, theſe uſually have the ſame ſtructure as the ſtalk itſelf, and vary very much in point of number, direction, and other circumſtances unneceſſary to dwell on.

REPENS; creeping horizontally along the ground, and ſending forth radiculæ at the joints, as in Potentilla Reptans.

SARMENTOSUS; a creeping ſtalk almoſt naked, producing leaves at the joints, as in the Vine.

SCANDENS; climbing as in Bryony.

SIMPLEX; a ſimple ſtem, not dividing, but continuing a ſingle ſtem up to its apex.

Solidus; a ſolid ſtem, oppoſed to Inanis, and Fiſtulous, as in Aſparagus.

Spinosus; having ſtrong woody prickles proceeding from the lignous part of the ſtem, as in Hawthorn.

Striatus; grooved, or ſuperficially channelled, as in Scandix Corofolia.

Sulcatus; deeply grooved or channelled, as in Oenanthe Crocaliti.

Teres; cylindrical.

Tetragonus; four-cornered, as in Monarda.

Trigonus; three-cornered, as in Scirpus Mant.

Urens; ſtinging, as in nettle.

Volubilis; turning up a pole or ſtem of another plant in a ſpiral form, as in Hop.

Plate 18

Fig 1

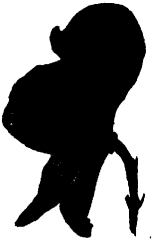


Fig 2

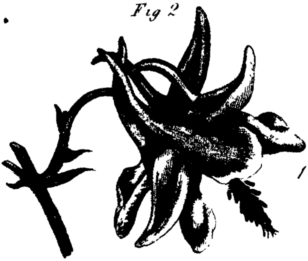


Fig 3

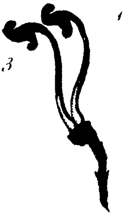
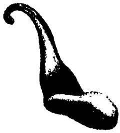


Fig 4



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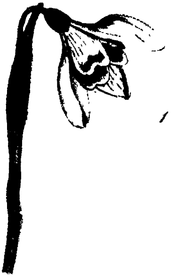

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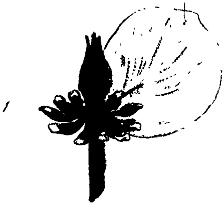

Fig 7

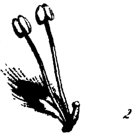

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PLATE XVIII.

ON THE PARTS OF FRUCTIFICATION.

On the Nectarium.

Fig. 1.—Nectarium in the Aconite, appearing like two horns, Fig. 3. under the coul or hood. 1.

Fig. 2.—Nectarium in the Columbine.

Fig. 4.—One of the parts detached.

Fig. 5.—Nectarium in the Snow-drop. 1.

Fig. 6.—Nectarium in the Hellebore. 1.

Fig. 7.—Nectarium in the Willow. 2.

Plate 19 X

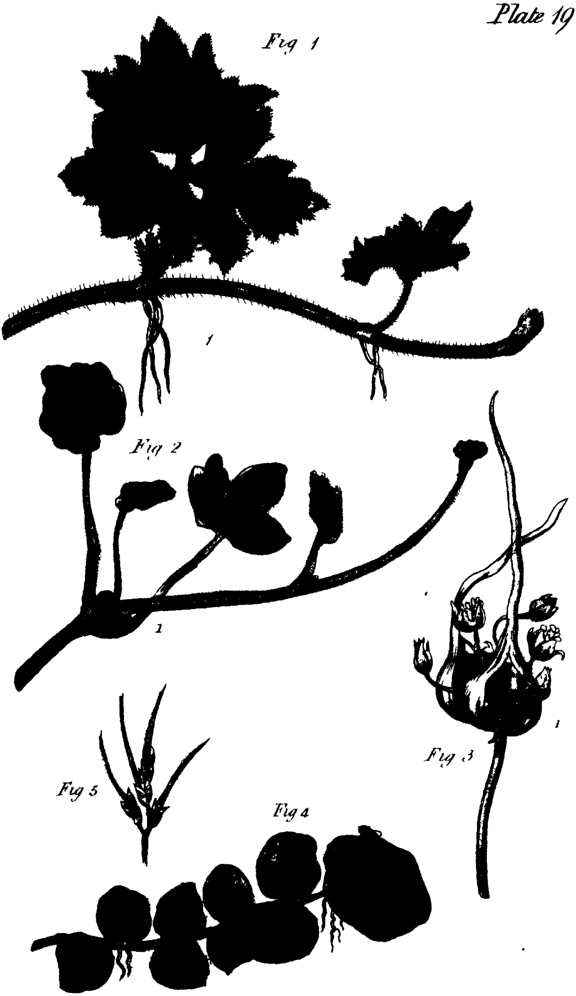

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PLATE XIX.

ON ROOTS.

Fig. 1.—Part of a ſtalk of Creeping Crow-foot, ſhewing a mode of increaſing plants, viz. by roots ſpringing from the ſtalk. 1.

Fig. 2.—Another mode of increaſing plants, viz. by bulbs forming in the alœ of the leaves, as in pilewort. 1.

Fig. 3.—Shews bulbs formed in the head of a plant of the onion tribe, whereby the plant is increaſed. 1.

Fig. 4.—A leaf of the Cuckow flower, in which the mid-rib has thrown out roots.

Fig. 5.—Part of a flowering branch of the Sheep's Feſcue Graſs, become viviparous, viz. throwing out ſhoots of graſs where the ſeed ſhould be formed, which falling on the ground take root.

SECTION VIII

On Leaves.

WE come in the next place to give you a general idea of the ſtructure of leaves, and to point out to you the principle different kinds as they are botanically conſidered.

Leaves are defined to be fibrous and cellular proceſſeſs of plants, which are of various figures, but generally extended, with a flat, membranous, or ſkinny ſubſtance.

In their ſtructure they conſiderably reſemble the ſtalk, and hence they may in ſome degree be conſidered as a ſtalk flattened.

The generality of leaves are obviouſly compoſed of, 1ſt, The lignous, or woody ſubſtance, diſtributed in innumerable ramifications through the middle of the leaf, and which gives it firmneſs and durability. 2d. The parenchyma, fleſhy or pulpy ſubſtance, placed on each ſide of, and in the interſtices of the woody net-work, forming the principle ſubſtance, and giving to the leaf its green colour; this ſubſtance, which is very tender, from its cellular ſtructure, is quickly deſtroyed by maceration, leaving the woody ſubſtance or ſkeleton of the leaf behind.

Theſe two parts are covered on each ſide by a membrane or ſkin, which is conſiderably tougher than the parenchyma, and not ſo ſoon deſtroyed by maceration.

Inſects frequently deſtroy one of the ſkins of the leaf, generally the under one, as being the moſt tender, together with the parenchyma, leaving the woody ramifications and upper ſkin entire; and ſometimes in herbaceous plants, where the woody ramifications are tender, a ſmall caterpiller or grub, hatched from an egg depoſited by a fly, between the two coats, will deſtroy both the woody and parenchymateous ſubſtances, leaving the two ſkins colourleſs.

The ſkeletons of leaves, made by maceration, are uſually exhibited by Lecturers on Anatomy; the beſt we have ſeen were in the muſeum of the late Sir Aſhton Lever; they appear to have been made with extraordinary care.

To ſucceed in making preparations of this kind, we ſhould ſelect ſuch leaves as are of a firm woody texture, as Holly, Pear, Tulip Tree, Poplar, Ivy, Eryngo, &c. and ſuch leaves for this purpoſe are beſt gathered in autumn, when they have acquired their greateſt firmneſs. They are to be macerated in water till you find the parenchymateous ſubſtance in a diſſolved ſtate; the ſkin on each ſide of the leaf is then to be very cautiouſly ſeparated. Skeletons of the leaves of Poplar, and Eryngo, are frequently found in gardens in the autumn, ready made; as are remarkably perfect ſkeletons of the ſeed-veſſel of the winter Cherry, made in the ſame manner by expoſure to the winds and rain.

Leaves appear to be the organs of perſpiration and inſpiration in plants.

The woody net-work we have been ſpeaking of, is covered, as we have ſhewn you, with a cuticle, which appears to be a continuation of the ſkin of the ſtalk; on the underſide of the leaf it appears to be furniſhed with a great number of abſorbent veſſels, deſtined to imbibe the humidity of the air. The upper ſurface turned towards the ſky, ſerves as a defence to the lower; and this diſpoſition is ſo eſſential to the vegetable economy, that if a branch be overturned in ſuch a manner as to deſtroy the natural direction of the leaves, they will of themſelves in a very ſhort time, reaſſume their former poſition, and that as often as the branch is thus overturned.

Leaves, then, are uſeful and neceſſary organs; trees periſh when totally diveſted of them. In general, plants ſtripped of any of their leaves, cannot ſhoot vigorouſly; witneſs thoſe which have undergone the depredation of inſects: witneſs likewiſe the very common practice of ſtripping off ſome of the leaves from plants, when we would diminiſh their growth, or leſſen the number of their ſhoots.

When vegetation ceaſes, the organs of perſpiration and inſpiration become ſuperfluous; plants therefore, at leaſt in this country, are not always adorned with leaves; they produce new ones every year, and every year the greater part are totally diveſted of them, and remain naked during the winter.

As the different kinds of ſtalks afford many excellent characters to diſtinguiſh plants, ſo the leaves being more variouſly diverſified, afford a ſtill greater number, and hence are diſtinguiſhed by a great diverſity of names. Leaves are primarily diſtinguiſhed into ſimple and compound.

A ſimple leaf is ſuch whoſe ſcotſtalk is terminated by a ſingle expanſion, and theſe according to a variety of circumſtances, aſſume different names, viz.

ACINACIFORME; ſcymeter ſhaped, implying ſubſtance, one edge of the leaf being convex and ſharp, the other ſtraight and thicker, as in the Meſemb Acinaciforme.

ACEROSUM; leaves ſurrounded at the baſe by chaffy ſquamæ, linear and abiding till the fruit, &c. is ripe, as in Juniperus.

ACULEATUM; beſet with prickly hairs or briſtles, as in Aſter Tenellus.

ACUMINATUM; Terminating in a long tapering point, as in Camilla Japonica.

ACUTUM; differing from Acuminatum in not extending itſelf into a ſubulated point, but terminating in an acute angle, as in Lamium Album.

ADNATUM; growing cloſe to the ſtem, as in Melianthus.

ADVERSUM; turning towards the South, as in Amomum.

AGGREGATA; ſo regularly compoſed that a leaf cannot be taken away without deſtroying the uniformity of the whole, as in Sempervivum.

ALTERNA; leaves growing alternately on the ſtalk, as in Convalaria Poligonum.

AMPLEXICAULE; the baſe of the leaf

ſurrounding the ſtem horizontally without ſheathing it, i. e. open behind, as in Braſica Napus.

ANGULOSUM; angular.

APPROXIMATA; growing near each other, oppoſed to remote.

AURICULATUM; ear ſhaped, as in Jungermannia celiaris.

AVENIA; having no veins viſible.

AXILLARE; inſerted under the baſe of a branch.

BARBATUM; hairs iſſuing from the tip of the leaf, as in the Meſembri Barbatum.

BIFARIA; a leaf pointing two ways.

BIFIDUM; cloven into two parts.

BULLATUM; when the Parenchymateous ſubſtance of the leaf riſes higher on the ſurface than the veins, ſo as to appear bliſtered.

CADUCUM; ſignifying the ſhorteſt time of duration, the leaf falling off at the firſt opening of the flower.

CANALICULATUM; having a deep groove or channel running from the baſe to the apex.

CAPILLACEUM; capillary, as in Jungermannia rupeſtris.

CARINATUM; when the inferior diſk, or lower ſide of the leaf, reſembles the keel of a ſhip, as in Hemerocallis Fulva.

CARNOSUM; a leaf of a fleſhy ſubſtance, ſofter than the Compactum, and more firm than the Pulpoſum, as in Sedum Deſyphylum.

CARTILAGINEUM; the margin of the leaf being ſtrengthened with a different ſubſtance from that of the diſk.

CAULINUM; growing immediately on the ſtem, without the intervention of branches, as in Agrimonia Eupatoria.

CILIATUM; whoſe margin is finally edged with hairs, as in Sempervivum.

CIRCINALIA; a term of foliation, expreſſive of the leaves being rolled ſpirally downward within the gemma, as in Felices.

CIRRHOSUM; a leaf terminating in a tendril, as in Niſſolia.

Coloratum; when leaves are of a different colour than green, though uſually ſo.

Compactum; when the parenchyma of the leaf is of a firm and hard ſubſtance.

Concavum; the upper ſurface of the leaf hollowed or concave.

Conduplicatum; a term ſignifying that the ſides of the leaf are parallel and approach each other, as in Amygdalus.

Conferta; crouded together, as in Antirrhinum Monſpeſſulanum.

Connata; when two leaves oppoſite are joined at their baſe, ſo as to have the appearance of one leaf, as Dipſacus.

Continuatum; continued, when the leaf appears to be a continuation of the ſubſtance of the caulis, as in Ficus.

Convexum; riſing from the margin to the centre of the upper ſurface of the leaf, reverſe of Concavum.

Convolutum; a term in foliation, when the leaf is rolled up in form of a ſcroll of paper, as in Arume.

CORDATUM; heart-ſhaped and blunt at the apex, as in Cyclamen Perſicum.

CRENATUM; bluntly notched, with teeth, or angles, inclining towards neither extremity, as in Sexifraga Geum; when a number of ſegments of ſmall circles, inſtead of angles, it is termed *obtuſe crenatum*; when the larger notches are themſelves ſurrounded with ſmall ones, *duplicate crenatum*.

CRISPUM; undulated from the margin of the leaf being too long for the diſk.

CUCULLATUM; rolled up longitudinally in a conical form, hooded or cowled, as in Sarracenia.

CUNEIFORME; gradually narrowed towards the baſe, wedge-ſhaped, as in Saxif Cuneifolia.

CUSPIDATUM; regards the apex only, and applied to thoſe whoſe leaves reſemble the point of a lance or ſpear.

DÆDALEUM; a leaf whoſe form or texture is remarkably beautiful.

DECIDUUM; expreſſing the ſecond degree of duration, falling off with the flower. See Caducum.

DECURRENS; when the baſe of a ſeſſile leaf extends itſelf downwards along the ſtem, beyond its uſual termination: i. e. when the baſis of the leaf is long in proportion and adheres entirely to the leaf, as in the Centaurea Glaſtifolia.

DECUSSATA; growing oppoſite in pairs, and each pair being alternately on oppoſite ſides of the ſtem.

DELTOIDEUM; a rhomboid leaf, conſiſting of four angles, in which the diſtance from the ſide angles to the baſe is ſhorteſt, as in Poplar. Vide. Berkenhouts's Lex. Botanic.

DEMERSUM; applies to aquatic plants ſunk below the ſurface of the water.

DENTATUM; toothed, diverging remote points on the margin, as in Arabis Alpina.

DEPENDENS; hanging down, pointing to the ground.

Depressum; depreſſed or ſunk in the center.

Disticha; growing in two rows, on two ſides of the branch only.

Dolabriform; in ſhape reſembling an hatchet, as in Meſembri Dolabriformis.

Ellipticum; elliptical, oval.

Enerva; having no viſible nerves. Vide Nervoſum.

Ensiforme; ſhaped like a two-edged ſword, gradually tapering to the point, as in Iris Verſicolor.

Erosum; when the margin appears gnawed or bitten.

Exsuccum; dry, when the ſubſtance of the leaf is nearly void of juice, oppoſed to Succulentum.

Farctum; ſtuffed, oppoſed to Tubuloſum.

Fasiculata; growing in bundles or bunches, as in Larch.

Fissum; a leaf ſplit or cloven half way down, according to the number of diviſions it is diſtinguiſhed, as bifidum, trifidum, multifidum, &c.

FLABELLATUM; fan-ſhaped, a leaf in ſhape of a fan.

FLORALE; thoſe which immediately attend the flower.

GEMINA; two growing together in a kind of bundle, as in Pinus Silveſtris.

GIBBUM; when the intermediate pulp renders both ſides of the leaf convex.

GLABRUM; ſmooth but not gloſſy.

HASTATUM; ſpear-ſhaped, the poſterior angles projecting ſide-ways, as in Solanum Dulcamarum.

HISPIDUM; covered with hairs or briſtles, as in Borage.

IMBRICATA; having flat ſurfaces parallel with each other, and lying over like the tiles of a houſe, as in Craſſula Quadrangularis.

INCANUM; covered with a whitiſh down, as in the Ciſtus Incanus.

INCISUM; cut into irregular ſegments, as in Ranunculus.

INFLEXA; bending upwards toward the ſtem.

INTEGERRIMUM; perfectly entire, as in Liguſtrum Vulgaris.

INVOLUTA; when the outer margins of the leaf are rolled on both ſides ſpirally inwards, as in Viola.

LACERUM; variouſly cut into irregular ſegments as if rent or torn.

LANATUM; covered with coarſe crooked hairs like wool, as in Stachys Lanata.

LANCEOLATUM; oblong, gradually tapering towards each point, as in the Geranium Linceolatum.

LACUNOSUM; deeply furrowed, when the veins of the leaf are ſunk much below the ſurface.

LINEARE; ſtraight, as in Roſmarinus.

LINGULATUM; tongue-ſhaped.

LOBATUM; divided almoſt to the center

into lobes, according to the number of lobes, bilobum, trilobum, and ſo on to as many as there may be in the leaf example. Hepatica.

LUCIDUM; clear, tranſparent.

LYRATUM; Harp-ſhaped, or in form of a lyre.

MEMBRANACEUM; membranous, having no diſtinguiſhable pulp between the two ſurfaces.

MUCRONATUM; ſharp pointed, as in Sempervivum Mucronum.

NATANS; a term for aquatic plants, ſignifying to ſwim on the ſurface, as in Nymphæ.

NERVOSUM; having nerves or veſſels extending themſelves from the baſe to the apex without branching out.

NITIDUM; bright, ſhining, gloſſy, as in Geranium Peltatum.

NUDUM; perfectly ſmooth, without hairs.

OBLIQUUM; tranſverſe, when the apex of the leaf points to the horizon, and the baſe upwards, as in the Protea.

OBLONGUM; being long in proportion from the baſe to the apex, both extremities being rounded, but narrower than the ſegments of a circle, as in Rumex Acetoſa.

OBOVATUM; egg-ſhaped, the ſmaller end being fixed to the ſtalk, as in the Primula Villoſa.

OBTUSUM; having a blunt or rounded apex, oppoſed to Acutum.

OBVOLUTUM; a term in foliation, ſignifying that the margins of the leaves alternately embrace the ſtraight margin of the oppoſite leaf, as in Dianthus, &c.

OCTONA; eight leaves growing together.

OPPOSITA; growing in pairs oppoſite to each other, as in Veronica Teucrium.

ORBICULATUM; the longitudinal equal to the tranverſe diameter, a round leaf, as in Hydrocotyle.

OVALE; oval, elliptical.

OVATUM; reſembling the longitudinal ſection of an egg, as in Viburnum Tinus.

PALMATUM; reſembling a hand, or palm of a hand, divided in ſeveral parts beyond the middle, as in Rheum Palmatum.

PAPILLOSUM; when the ſurface of the leaf is covered with dots or points like little bladders.

PAPULOSUM; when the ſurface is covered with pimples.

PARABOLICUM; in form of a parabola.

PARTITUM; divided nearly to the baſe, as in Anemone.

PELTATUM; the petiolus being inſerted into the diſk of the leaf, and not unto its baſe, as in Geranium Peltatum.

PERFOLIATUM; when the baſe of the leaf ſurrounds the ſtalk, it appearing to go through it, as in Bupleurum Rotundifolia.

PERSISTENS; expreſſes the third degree of duration. See Caducum Deciduum, remaining till the fruit is ripe.

PETIOLATUM; a leaf growing on a footſtalk, oppoſed to Seſſile, as in Veronica Montana.

PILOSUM; covered with long diſtinct hairs, as in Hieraceum.

PINNATIFIDUM; tranſverſely divided into long horizontal ſegments, as in Chelidonium Hybridum.

PIXIDATUM; when one leaf is, in reſemblance, let into another, as in Equiſetum.

PLANUM; neither concave nor convex, as in Cyclamen-coum.

PLICATUM; plaited like a fan, as in Eryngium Maritimum.

PULPOSUM; the pulp regarding the ſubſtance of leaves.

PULVERATUM; covered with a kind of meal or duſt, as on the inferior diſk of the Frankenia Pulverulenta.

QUATERNA; four leaves growing circularly round the ſtalk, as in Aſperula Taurina.

QUINA; five leaves, growing in ſame manner as in Veronica Virginica.

RADICALE; proceeding immediately from the root.

Radicatum; a leaf whoſe ſubſtance ſhoots out roots.

Rameum; inſerted on the branches.

Reclinatum; bending downward, the apex of the leaf being lower than the baſe.

Recurvatum; bending in a greater degree than Reclinatum, but not ſo much as Revolutum.

Reniforme; reſembling a kidney in ſhape, as in Saxifra granulata.

Repandum; having a ſerpentine margin with angles.

Retusum; terminating in an obtuſe ſinus, ſame as Obtuſum.

Revolutum; rolled backwards.

Rhombeum; diamond-ſhaped.

Rotundatum; rounded.

Rugosum; wrinkled, when the ſubſtance of the leaf riſes above the veins, as in Horehound.

Runcinatum; a kind of pinnatified leaf, in which the lobes are anteriorly convex, and poſteriorly tranſverſe, as in Leontodon.

SAGITTATUM; ſhaped like the head of an arrow, as in Saliva Gluten.

SCABRUM; rough, oppoſed to Glaber, as in Pulmonaria Officinalis.

SCARIOSUM; ſonorous.

SEMINALE; the ſeed leaf, the leaves into which the cotyledons of the ſeed expand, as in Turnip, Radiſh, &c.

SEMPERVIRENS; the longeſt degree of duration, evergreen. See Caducum, Deciduum, Periſtens.

SENA; growing in ſixes, as in Veronica Siberica.

SEPTENA; having ſeven on a footſtalk, as in Coronilla Glauca.

SERICEUM; when the ſurface is covered with ſilky down, of extreme fine texture, as in Lotus Creticus.

SERRATUM; ſharply toothed, or ſaw-ſhaped at the margin, as in Serratula.

SESSILE; growing immediately on the caulis, as in Veron Cham.

SETACEUM; fine and tapering like a briſtle, as in Aſparagus.

SINUATUM; having wide hollows on the margin.

SPARSA; irregularly ſhaped, as in the lilies.

SPATULATUM; roundiſh at the apex, but lengthened by a narrower baſe in form of a Spathula.

SPINOSUM; prickly, having ſharp prickles on the margin.

SPLENDENTIA; ſhining. See Nitidum.

STELLATA; ſurrounding the ſtem like the radix of a circle. See Verticullata.

SUBULATUM; awl-ſhaped, as in Sedum Reflexum.

TERES; ſuch as by their internal pulp are rendered in part cylindrical, as in Allium.

TERNA; three leaves growing round the ſtalk circularly, as in the Veron Spuria.

TOMENTOSUM; covered with numerous white hairs ſo cloſely matted as ſcarcely to be diſtinguiſhed, as in Ceraſtatium Tomentoſum.

Trifidum; being thrice divided by linear ſinuſes, having ſtraight margins, as in Reſida Lutea.

Trina; three leaves growing in a ſmall bundle, as in Pinus.

Trinervium; having three apparent veins running from the baſe to the apex, without branching. See Triplinervum.

Tripartitum; conſiſting of three diviſions down to the baſe, as in the Eryngium Campeſtris.

Triplinervium; whoſe apparent veins run in three's, or three-fold, from the baſe to the apex, without branching. See Trinervum.

Triquetrum; when applied to leaves, means their ſubſtance as triangular, their figure conſidered in one plane, as in Anthericum Oſſifragum.

Truncatum; having its apex truncated, or cut off.

TUBULOSUM; when cut tranſverſely it appears hollow within, as in Allium.

VAGINANS; the lower part of the leaf forming a ſheath to the ſtem, as in Ciſtus Incanus.

VENOSUM; whoſe veins branch and ſpread over the whole ſurface of the leaf.

VERTICILLATA; ſurrounding the ſtem like the radii of a wheel.

VILLOSUM; wooley, covered with diſtinct ſoft hairs, as in Primula Villoſa.

VISCIDUM; when the ſurface is clammy, Senecio Viſcoſus.

UNDULATUM; when the ſurface riſes in waves from the diſk to the margin, as in Oenothera Molliſſima.

URENS; burning, ſtinging, as in Nettle.

SECTION IX

Of Compound Leaves.

COMPOUND leaves are ſuch whoſe footſtalks are terminated by more than one expanſion, or whoſe footſtalk ſupports more than one leaf. The principal diſtinctions are,

ARTICULATUM; when one leaf grows from the extremity of another.

DIGITATUM; when a number of leaflets, or ſmall leaves are connected to the extremity of a footſtalk, from whence they proceed like Radii, totally unconnected as in Lupin or Hemp.

PEDATUM; when the footſtalk divides

into two, and connects the leaflets on its interior ſides only, as in Helleborus Fœtidæ.

PINNATUM; when many leaflets are connected, or grow on each ſide of a common footſtalk, as in Polemonium.

ABRUPTE; when the ſame terminates abrupt, or without a leaflet.

INTERRUPTE; when the leaflets are alternately leſs.

BIPINNATUM DECOMPOSITUM; or doubly pinnated; twice pinnated.

TRIPINNATUM SUPRADECOMPOSITUM; trebly pinnated, as in ſome of the Polypodiums.

SECTION X.

On the Fulcra of Plants.

THE other parts uſually attendant on the ſtalk, are called by Linnæus, Fulcra (from Fulcrum, a prop) and are calculated either to aſſiſt the plant in its growth, or to defend it from injuries.

Of theſe Linnæus enumerates ſeven different kinds, viz.

Bractea; leaves growing with the flowers, and uſually differing greatly in ſhape and colour. Pl. 20.

Pubes; all kinds of hairineſs, whether fine or coarſe; whether terminating in a fine point or a viſcid globule. Pl. 24.

Petiolus; the footſtalk of a leaf.

PEDUNCULUS; the footſtalk of a flower.

STIPULÆ; a ſmall leaf uſually placed in pairs at the joints of the plant: attendant on moſt of the Liguminous plants, varying much in number and form. Pl. 21.

CIRRHUS; a claſper or tendril, by which the plant faſtens itſelf to any other body; as the Hop round the pole, &c. Pl. 22.

ARMA; arms or weapons, intended by Nature to ſecure them from external injuries: they conſiſt of four different ſpecies, viz. 1ſt, ACULEUS; prickles, which are fixed only to the rind, ſo as to be eaſily ſeparated from the plant, without tearing the Ligneous part, as in Roſa.—2d, FURCÆ, or Forks; when ſeveral of theſe grow together they are diſtinguiſhed thus: bifidæ, trifidæ, according to the number of prongs in each Furca, as in Barberries.—3d, SPINA; rigid prickles which cannot be removed without the Ligneous part too, as in Prunus.—4th, STIMULI; ſtinging, as in the Urtica. Pl. 23.

Plate 20

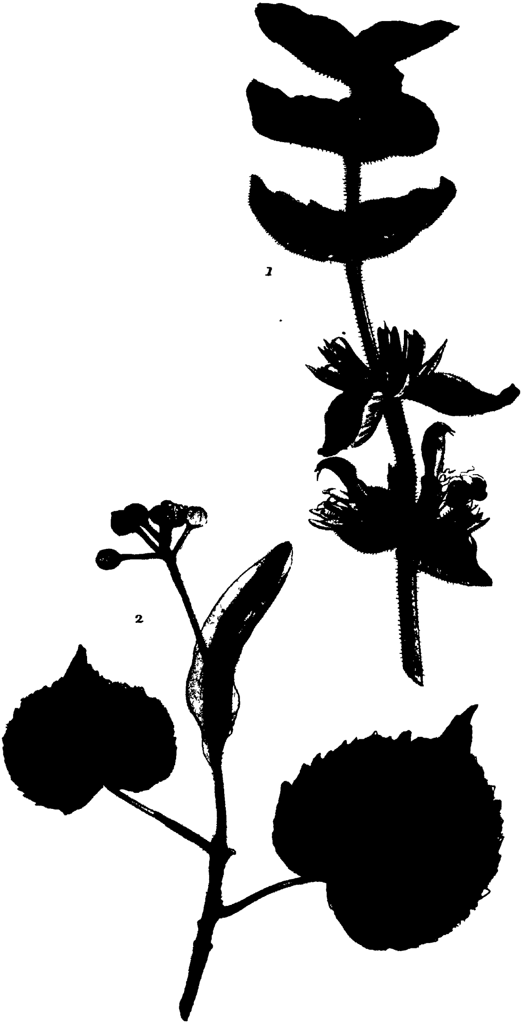

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PLATE XX.

ON THE FULCRA OF PLANTS.

Fig. 1.—Bractea; ſhewing an inſtance wherein the floral leaves differ much in colour from thoſe of the reſt of the plant, called Bracteæ coloratæ.

Example.

Purple Top'd Clary.

Fig. 2.—Bractea; ſhewing an inſtance of the floral leaves differing in ſhape from thoſe of the reſt of the plant.

Example.

Lime.

Plate 2.

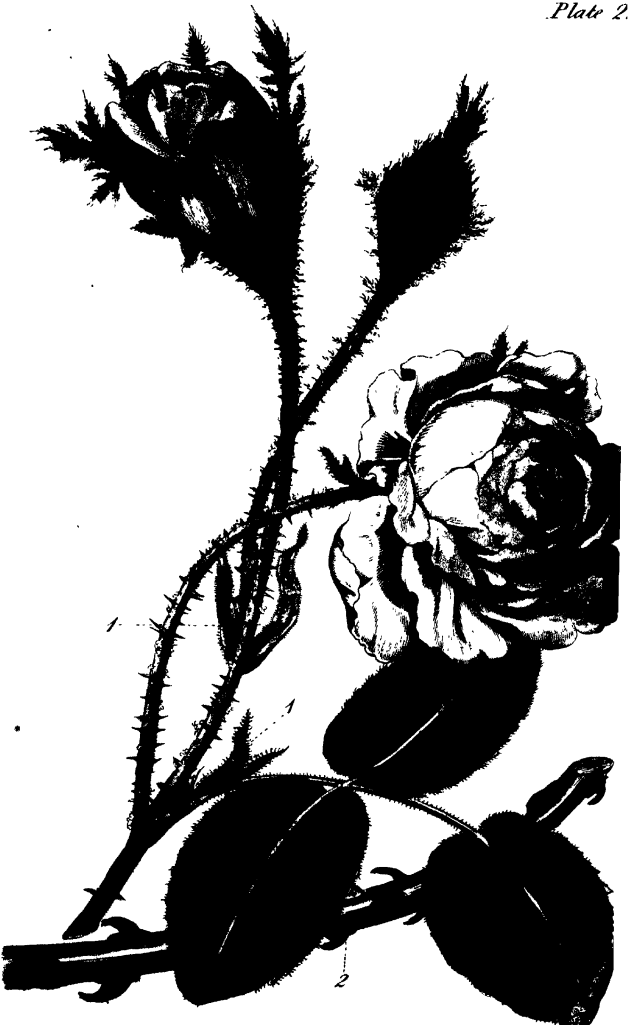

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PLATE XXI.

ON THE FULCRA OF PLANTS.

Fig. 1.—Stipulæ; when ſmall leaflets are growing at the joints of plants, either at the footſtalk of a leaf or flower, they are generally in pairs, ſometimes more.

Fig. 2.—Aculeus; prickles which are eaſily ſeparated without tearing the wood.

Example.

Roſe.

Plate 22

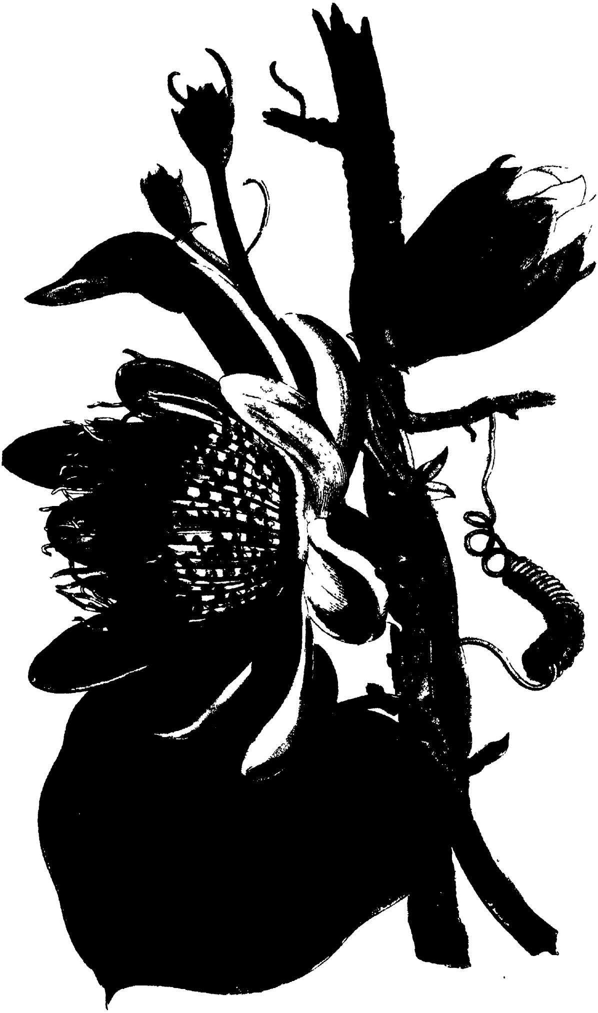

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PLATE XXII.

ON THE FULCRA OF PLANTS.

Fig. 1.—Cirrhus; a claſper or tendril, that ſpiral ſtring by which ſome plants attach themſelves to other bodies, attendant on moſt of the climbing plants.

Example.

Paſſion Flower.

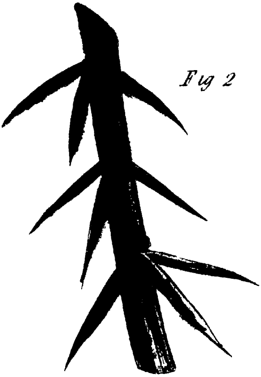
Fig 2

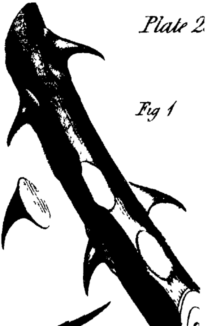
Fig 1

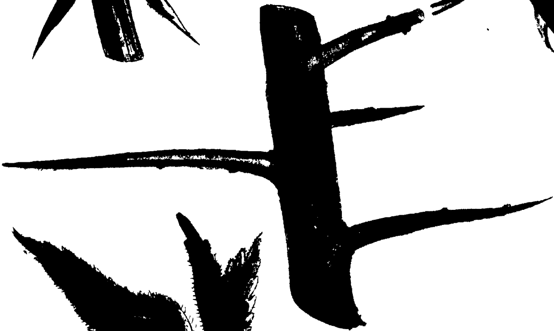
Fig 3

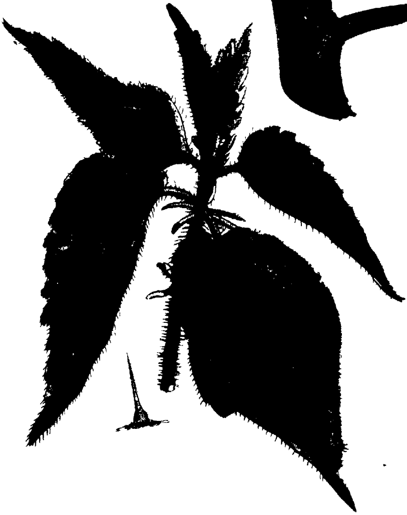
Fig 4

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PLATE XXIII.

ON THE FULCRA OF PLANTS.

Fig. 1.—Arma; arms or weapons to defend them from external injuries; a ſpecies of arma called aculei, prickles which are only fixed in the rind, and may be ſeparated without tearing the ligneous parts, as in roſe.

Fig. 2.—Furcæ; forks; when ſeveral of them grow together they are diſtingniſhed by bifida, for two; trifida, for three, and ſo on.

Example.

Barberry.

Fig. 3.—Spina; rigid prickles which cannot be ſeparated without tearing the ligneous parts.

Example.

Plumb.

Fig. 4.—Stimuli; ſtinging, as in nettle.

Plate 24

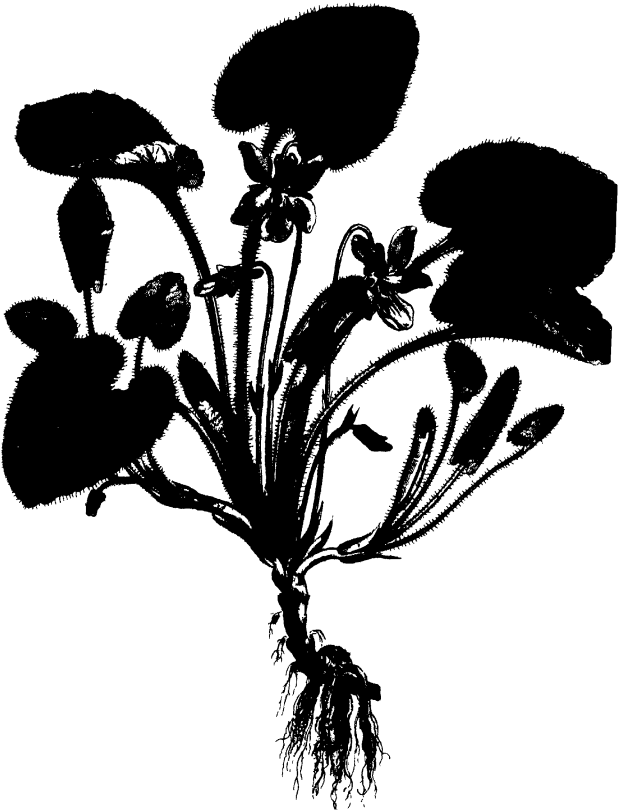

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PLATE XXIV.

ON THE FULCRA OF PLANTS.

Fig. 1.—Petiolus, the Footſtalk of a Leaf which does not ſupport the Flower.—Pedunculus, the Footſtalk of a Flower which does not ſupport the Leaves.—Pubes, all kinds of hairineſs, whether coarſe or fine, whether terminating in a ſharp point, or viſcid globule.

Example.

Violet.

SECTION XI.

On Infloreſcence.

IT now remains for us to ſhew you the different kinds of Infloreſcence or modes, in which plants flower; of theſe Linnæus enumerates ſeveral different kinds, the principal of which are:

1ſt. VERTICILLUS, or Whirl; a mode of flowering in which the flowers are diſpoſed circularly at each joint of the ſtem, having very ſhort footſtalks, exemplified in Mint, Horehound, and other plants, hence called Verticillatæ. Pl. 25.

2d. SPICA; a mode of flowering, in which the flowers are ranged alternately upon both ſides or all round a ſimple common flower-ſtalk; in general the flowers are ſeated immediately on the ſtalk, without any partial footſtalk, or if there are any footſtalks, they are uſually very ſhort. When theſe flowers grow all to one ſide, it is called Spica Secunda; when from each ſide, Diſticha. Pl. 26.

3d. RACEMUS; a mode of flowering in which the flowers, placed along a common footſtalk, are furniſhed with ſhort proper footſtalks, proceeding as lateral branches from the common flower ſtalk. Pl. 27.

4. PANICULA; a mode of flowering in which, according to Linnæus, the fructifications are diſpoſed on footſtalks variouſly ſubdivided. Pl. 28.

5. THYRSUS; a mode of flowering reſembling the cone of a Pine, is a panicle contracted into an oval or egg-ſhaped form. Pl. 29.

6. UMBELLA; a mode of flowering, in which a number of ſlender footſtalks proceed from the ſame center, and riſe to an equal

height, ſo as to form an even and generally a round ſurface at top. Plants producing umbels, are called Umbelliferous Plants. Pl. 30.

7. Cyma; a mode of flowering, in which, like the Umbell, a number of ſlender footſtalks proceed from a common center, and riſe to the ſame height, but, unlike the Umbell, the ſecondary or partial footſtalks are diſpoſed without any regular order. Pl. 31.

8. Corymbus; a mode of flowering, in which the partial flower-ſtalks are produced along the common ſtalk on both ſides, and though of unequal lengths, riſe to the ſame height, ſo as to form a flat and even ſurface at top. Pl. 32.

9. Capitulum; a mode of Infloreſcence, in which many flowers are collected into a head at the extremity or ſummit of the footſtalk. Pl. 33.

ON

THE PARTS

FRUCTIFICATION.

SECTION XII.

On the Parts of Fructification.

BY the parts of Fructification in vegetables, we underſtand thoſe of the flower and fruit, and theſe, according to Linnæus, are ſeven in number.

1. The Calyx.
2. The Corolla.
3. The Stamen.
4. The Pistillum.
5. The Pericarpium.
6. The Semen.
7. The Receptaculum.

To theſe may be added another, viz. the Nectarium, for though it is not found in all flowers, it is to be met with in a great number of them.

Plate 25

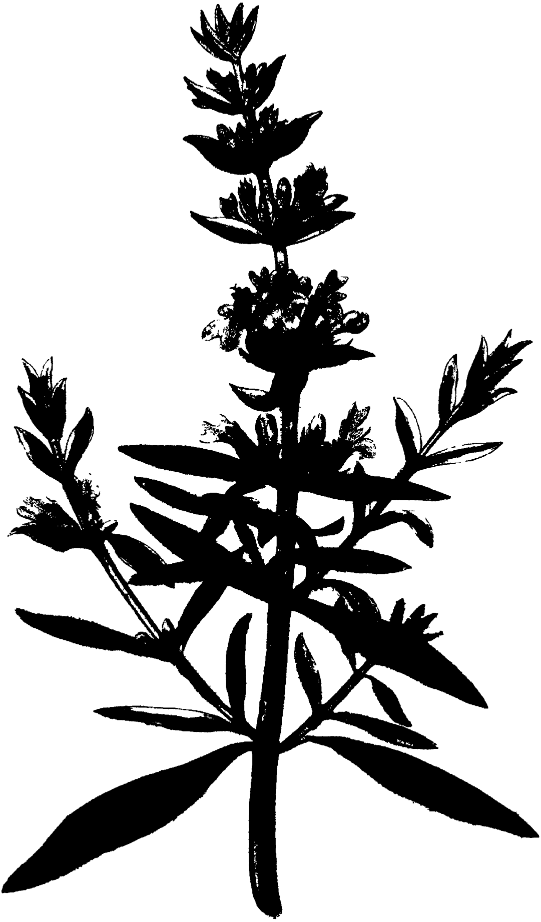

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PLATE XXV.

ON INFLORESCENCE.

Verticillus, a ſpecies of Infloreſcence in which the Flowers grow in whirls round the ſtem.

Example.

Hyſop.

Plate 26

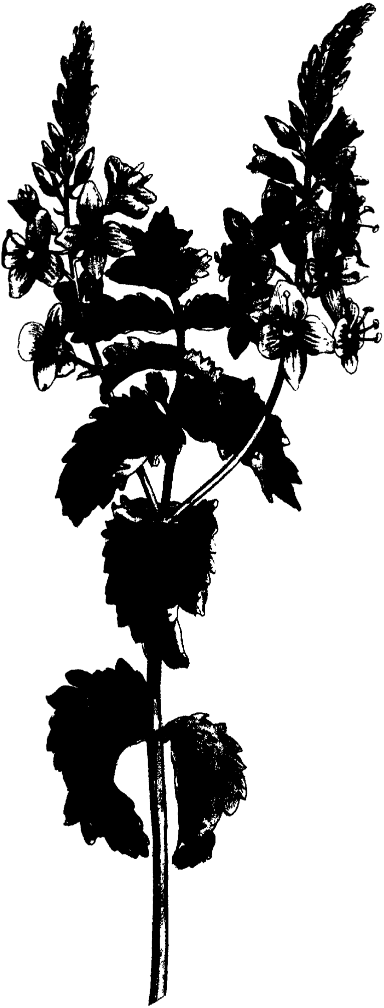

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PLATE XXVI.

ON INFLORESCENCE.

Spica, a ſpecies of Infloreſcence reſembling an Ear of Corn; it includes a great variety of Plants, under which denomination comes moſt flowers whoſe bloſſom runs tapering up the ſtem.

Example.

Veronica Tucrum.

Plate 27

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PLATE XXVII.

ON INFLORESCENCE.

Racemus, conſiſting of a Pedunculus with ſhort lateral branches. A Racemus may be of many different kinds, as ſimple, compound, erect, hanging down, &c. Its ſtrict explanation is a bunch of Berries, ſuch as Grapes, Currants, &c.

Example.

Red Currant.

Plate 28

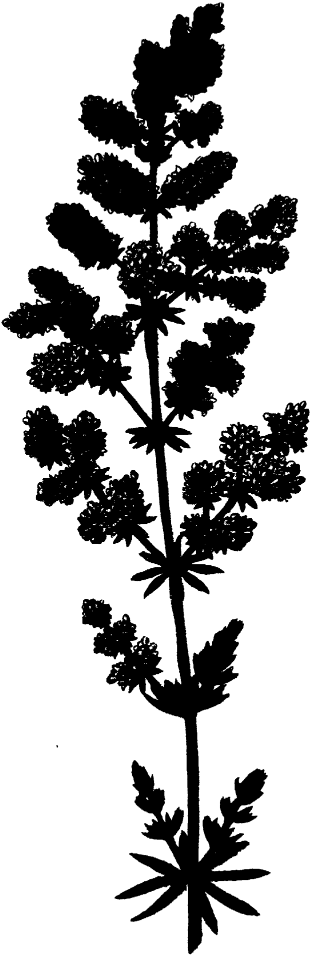

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PLATE XXVIII.

ON INFLORESCENCE.

Panicula, a ſpecies of Infloreſcence wherein the outline of the entire figure is nearly elliptical.

Example.

Ladies Bed Straw.

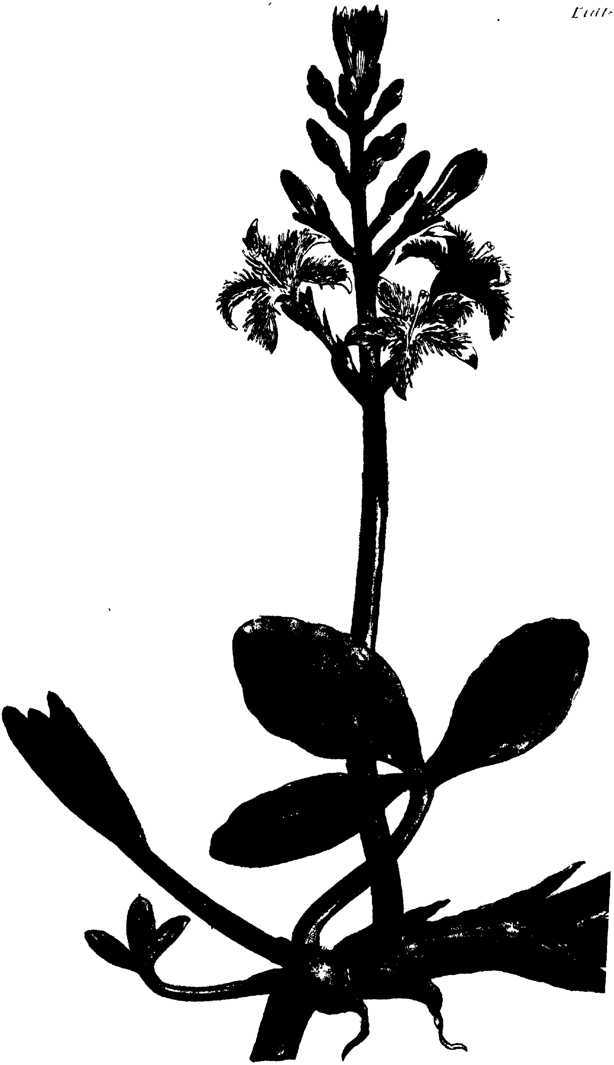

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PLATE XXIX.

ON INFLORESCENCE.

Thyrſus. Linnæus defines it to be a Panicle contracted into an oval or egg-ſhaped from; its origin ſeems to have been from the cuſtom of the ancients, of carrying, at the feaſts of Bacchus, a ſpear wrapped about with Ivy.

Example.

Buckbean.

Plate 30

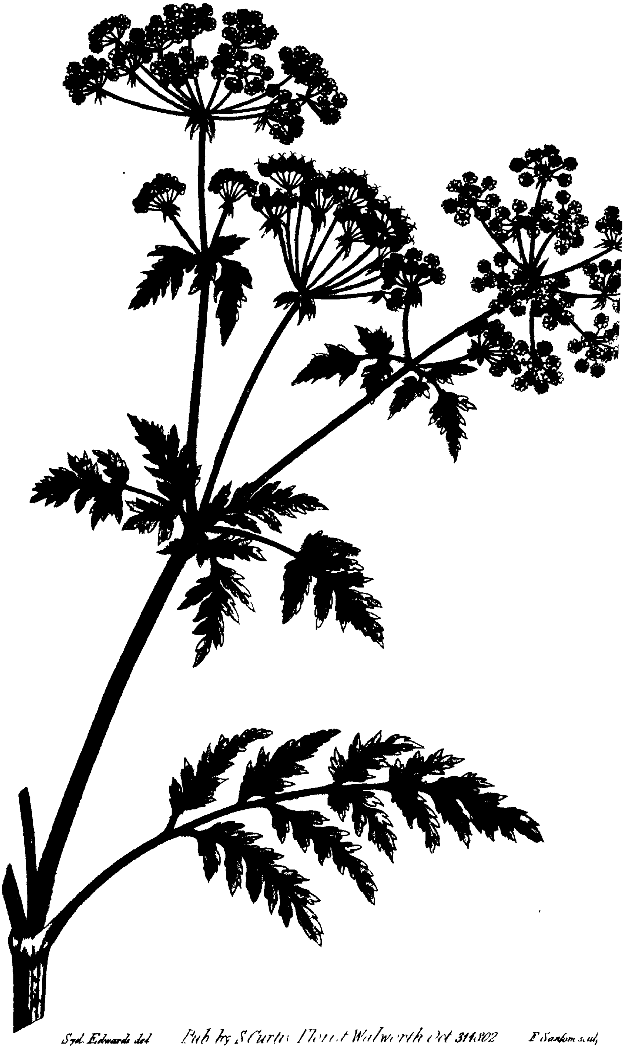

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PLATE XXX.

ON INFLORESCENCE.

Umbella, a ſpecies of Infloreſcence producing Umbels, i. e. many Pedunculi from one common center, proceeding to an equal length, which, ſpreading, forms itſelf ſimilar to an Umbrella. All plants which come ſtrictly under this denomination, are of the claſs and order Pentandria Diginia.

Example.

Hemlock.

Plate

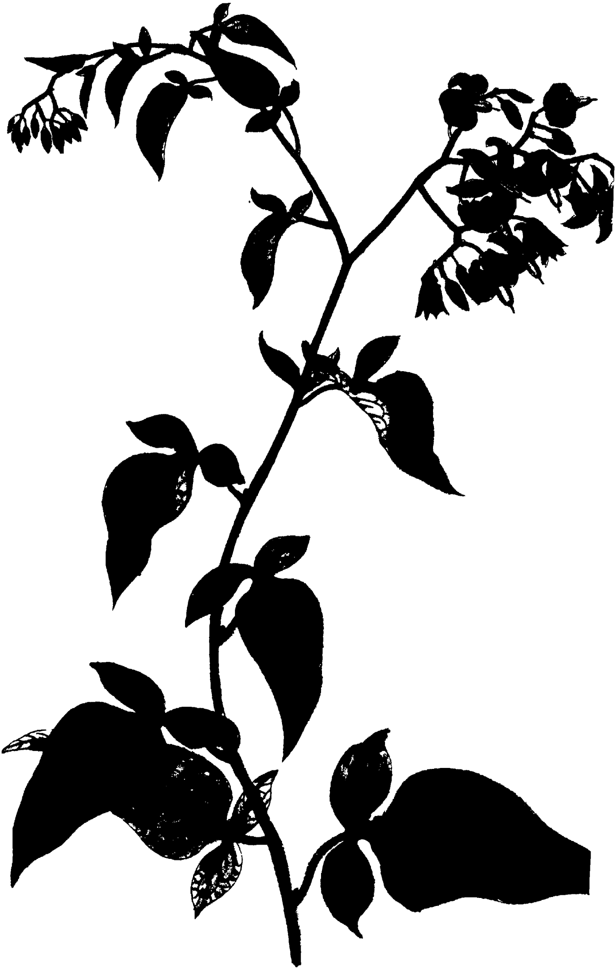

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PLATE XXXI.

ON INFLORESCENCE.

Cyma, a mode of Infloreſcence which, like the Umbell, the Footſtalks proceed from one center, but differ from the Umbell in the partial Footſtalks, which proceed from the primary ones, being diſpoſed without any regular order.

Example.

Deadly Nightſhade.

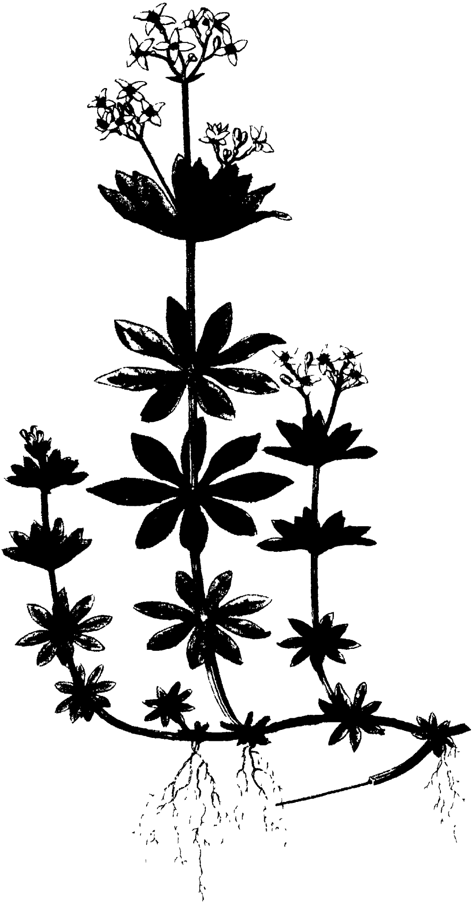

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PLATE XXXII.

ON INFLORESCENCE.

Corymbus, a ſpecies of Infloreſcence, in which the partial flower-ſtalks, which are produced on both ſides of the common ſtalk, ariſe to an equal height, the flowers growing in cluſters, each on a ſeperate pedunculus.

Example.

Sperula Odorata,
Woodruff.

PLATE XXXIII.

ON INFLORESCENCE.

Capitulum, a ſpecies of Infloreſcence, in which the flowers are collected into a head at the ſummits of the Pedunculus,

Example.

Auricula,

The firſt of theſe, the CALYX, or Flower-cup, is the exterior green part of the flower, which encloſes and ſupports the bottom of the Corolla, and frequently covers it before its expanſion.

The ſecond part, the COROLLA, is that delicate coloured part of the fructification which is encloſed by the Calyx, and known by the name of the Flower.

The third part, the STAMEN, or STAMINA, if there be more than one, which moſt commonly happens, are thoſe ſmall thread-like ſubſtances found in the inſide of the flower, and placed next to the Corolla.

The fourth part, the PISTILLUM, is the ſmall upright body or column, placed in the very center of the flower, ſhewn in Primula.

By the term Flower, we underſtand the four parts now mentioned, viz. the Calyx, the Corolla, the Stamen, and the Piſtillum; you are not to expect however to find all theſe parts in every flower: many have no Calyx, as the Tulip, Pl. 37. and Crown Imperial; ſome have no Corolla, as in Hemp, Willow, and Ladies Mantle; and there are a few inſtances of ſome flowers having neither a Calyx nor Corolla, as in the Hippuris, or Mare's-tail, in which there is only one Stamen and one Piſtillum, and which therefore is the ſimpleſt flower poſſible.

The fifth part, the PERICARPIUM, is the ſeed-veſſel which remains after the ſeveral parts of the flower are decayed, and contains

The ſixth part, the SEMEN, or ſeed of the plant, theſe two uſually conſtitute the fruit.

The end of the ſtalk, which ſupports all the other parts of the fructification, is called the RECEPTACULUM, and conſtitutes the ſeventh part.

We cannot compliment Linnæus on the happineſs of the term Receptaculum, as it ſeems to convey an idea different from what he intends. Botaniſts before him, uſed the word THALAMUS, which it is rather a matter of ſurprize that Linnæus ſhould not adopt, ſince it would have accorded ſo well with the other ſimilies he has been ſo fond of applying to his doctrine of the ſexes.

This part belongs equally to the flower and fruit. Beſides theſe, as we obſerved to you, there is an additional part found in many flowers, called the NECTARIUM, which is extremely various both in its forms and uſes. It ſometimes appears as a gland ſecreting the honey, as in the Willow, and Crown Imperial, and Geranium Lamium. At other times it ſerves as a kind of veſſel to receive it, as in Hellebore. It aſſumes beſides a variety of anomalous appearances, which we ſhall ſhew you when we come more particularly to treat of this part. We may make this general obſervation on the Nectarium, that if any part occurs in the flower, whatever may be its form, if it does not appear to anſwer the purpoſe of any of the other parts of the fructification, it may be conſidered as the Nectarium.

Having endeavoured to give you a general idea of the ſeveral parts of the fructification, we ſhall now treat more particularly of the form and different kinds of each.

The CALYX, or Flower-cup, as we obſerved to you, is the exterior green part of the flower, which encloſes and ſupports the bottom of the Corolla, and frequently covers it entirely before its expanſion; it is not preſent in all flowers, being wanting in the Lily, Tulip, Crown Imperial, and many others. In ſome caſes the Calyx appears to be wanting, when in reality it is not. The reaſon is, that the Calyx drops off immediately on the expanſion of the flower, as in Poppy; its colour is moſt commonly green, but in ſome few inſtances it is met with of ſome other brilliant hue. By culture, the Calyx in ſeveral plants, particularly the Cowſlip, Primroſe, and Polyanthus, is apt to be changed into the nature of the Corolla; and the Corolla of the Tulip ſometimes aſſumes the appearance of a Calyx. In ſome inſtances therefore it is difficult to decide from appearances which is the Calyx and which the Corolla. In the Hellebore for inſtance, how great is the difference betwixt the Helleborus, Hyemalis, and Fætidus, for theſe are undoubtedly of the ſame genus. The Corolla in the Hyemalis is tender and delicate, of a fine yellow colour, and ſoon falls off; whereas in the Fætidus, it is of a green colour, of a thick clumſy texture, and remains till the ſeeds are ripe; this ſeems to ſhew that Nature has placed no abſolute limits betwixt Calyx and Corolla.

The Calyx is defined by Linnæus to be the termination of the Cortical Epidermis, or outer bark of the plant, which, after accompanying the trunk or ſtem through all its branches, breaks out with the flower, and is preſent in the fructification in this new form.

Whether this be really the caſe or no, is of little importance; it is an opinion which is controverted by Grew and Hedwig.

The uſe of the Calyx, as Dr. Grew obſerves, is evidently to encloſe, ſecure, and ſupport, the other parts of the flower; to be their ſecurity before its opening, by intercepting all extremities of weather, and afterwards to be their ſupport by containing all their parts in their due and graceful poſition. Hence, continues the ſame author, we have the reaſon why the Calyx is frequently various, and ſometimes wanting; ſome flowers have none, as Tulips, becauſe having a flat or firm leaf or petal, and each leaf likewiſe ſtanding on a broad and ſtrong baſis, they are thus ſufficient of themſelves. Carnations on the contrary, have not only an empalement or Calyx, but for the greater ſupport of the petals, it is compoſed of one piece, for otherwiſe the foot of each leaf or petal being very long and ſlender, moſt of them would be apt to break out of compaſs.

Thus far then as to what the Calyx is, and its uſes. In ſuch an infinity of vegetable productions as Linnæus had to arrange, divide, and ſubdivide, it became neceſſary to give different names even to the ſame parts of the plant, according to the different appearances it aſſumed; hence Linnæus enumerates ſeven different kinds of Calyx, viz. 1. Perianthium; 2. Involucrum; 3. Gluma; 4. Amentum; 5. Spatha; 6. Calyptra; 7. Volva. Pl. 34.

The firſt of theſe, the CALYX PERIANTHIUM, Linnæus defines to be that kind of Calyx which is contiguous to the fructification, as in Primroſe, Convolvolus, and by far the greater number of plants.

2d. INVOLUCRUM, is when the Calyx, uſually conſiſting of ſeveral leaves, is ſituated at the foot of an Umbel, as in the Umbelliferous Plants, ſuch as Hemlock, Cow-parſley, Chervil, and in a few others, which are not termed Umbelliferous Plants, though growing in an Umbel, as the Flowering Ruſh, and Cowſlip; it occurs alſo in ſome ſingle flowers, as the Anemone and Paſſion Flower.

3d. The Calyx GLUMA, is confined to the Graſſes.

4th. The AMENTUM is confined to trees bearing catkins, as the Willow, Hazel.

5th. The SPATHA, is a kind of Calyx of a ſheath-like form, common to flowers having bulbous or tuberous roots, as in Narciſſus and Iris.

6th. The CALYPTRA is peculiar to Moſſes.

7th. The VOLVA, which is peculiar to Muſhrooms.

We obſerved to you before that the CALYX PERIANTHIUM was by far the moſt common kind of Calyx, and of this there are many variations; thus it is called a PERIANTHIUM of the FRUCTIFICATION, when it includes both the Stamina and Rudiment of the fruit, as in Primroſe; a PERIANTHIUM of the FLOWER, when it *contains* the Stamina without the Rudiments of the fruit, as in the Evening Primroſe, and Willow Herb: and a PERIANTHIUM of the FRUIT, when it contains the Rudiment of the Fruit, without the Stamina. This latter is exemplified in the Morina Perſica of Tournifort, but inſtances of this kind of Calyx are very rare. It aſſumes different names according to the number of parts into which it is divided; thus it is called Monophyllus when compoſed of one leaf; Diphyllus, when compoſed of two; Triphyllus, when compoſed of three, and ſo on. It takes the name of Commune, when it ſupports and connects together a great number of florets, as in Centaurea, and moſt of the compound flowers; and as in theſe flowers the Perianthium is uſually compoſed of a number of leaves or ſcales, lying one over the other, like tiles on the top of a houſe, it moſt commonly takes the name of Imbricatum.

Having now ſhewn you the Calyx, and many of the various forms it aſſumes, we come next to treat of the COROLLA, a part of the Fructification, equally, if not more various in its appearance.

The COROLLA, as we before obſerved to you, is that delicate coloured part of the Fructification which is encloſed by, and ſituated next to the Calyx.

When we ſpeak of this part in general terms, we call it the Corolla, it takes likewiſe the ſubordinate or partial name of Petal. Thus when the Corolla is compoſed of one petal, as in the Primroſe; ſometimes it is compoſed of ſeveral pieces, as in the Tulip; each of thoſe diviſions is called a petal, according to the number of pieces, it takes the name of Monopetala, Dipetala, Tripetala, and ſo on to Polypetal; inſtances of the latter occur in Trollius and Nymphæ.

The lower narrow part of a Monopetalous Corolla, is called the Tubus, or Tube; the upper ſpreading part, the Limbus, or Limb.

The lower narrow part of a Polypetalous Corolla, affixed to the receptacle, is called the Unguis, or Claw; the upper ſpreading part, Lamina.

The Corolla alſo aſſumes different names, according to the diverſity of its form; thus it is called CAMPANULATA, or bell-ſhaped, when growing ſomewhat in the form of a bell, as in Bell flower, and Deadly Nightſhade.

INFUNDIBULIFORMIS, or funnel-ſhaped.

HYPOCRATERIFORMIS, or ſalver-ſhaped, having a flat limb placed on a tube, as in Vinca.

ROTATA, or wheel-ſhaped, a flat limb without any tube, as in Borage.

RINGENS, gaping or grinning; an irregular Corolla, which gapes and divides into two lips; the opening between the two lips is called the Faux, or Mouth. When the Faux, or Mouth, in a ſimilar kind of flower, is filled with an intervening ſubſtance, or Palate, it is then called COROLLA PERSONATA, as in Anterrhinum.

The Corolla is called CRUCIATA, or croſs-ſhaped, when it is compoſed of four equal ſpreading petals, which ſomewhat reſemble a croſs, as in Wallflower.

PAPILIONACEA, when we have an irregular Corolla, conſiſting of four petals, the uppermoſt of which ſpreading wide, is called the Vexillum or Standard; the two ſide ones, the Ala, or Wings; and the lowermoſt, which is ſomewhat boat-ſhaped, the Carina, or Keel. A Corolla is called Compoſita, or compound, when it conſiſts of a number of florets or ſmall flowers, placed on one common receptacle, and contained within a common Calyx; and of compound flowers there are three kinds, viz. Ligulata, Tubuloſa, and Radiata.

LIGULATA; is when all the florets are flat, as in Dandelion.

TUBULOSA; when all the florets are tubular, and nearly equal, as in the Thiſtles and Knapweed.

RADIATA; when the florets in the center are tubular, thoſe in the circumference flat and ſpreading, as in Daiſy and Ragwort.

Having, we fear, almoſt tired you with technical terms, which, however neceſſary, are far from captivating, we ſhall defer treating of the remaining part of the Fructification to another Lecture.

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Plate 36

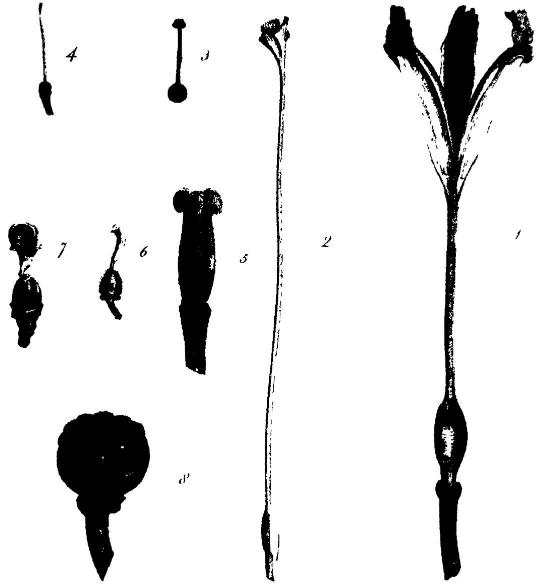

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PLATE XXXVI.

ON THE PARTS OF FRUCTIFICATION.

Various Piſtilla

Fig. 1.—Piſtillum in the Iris.
2. ——— in the Crocus.
3. ——— in the Primroſe.
4. ——— in the Comfrey.
5. ——— in the Tulip.
6. ——— in the Violet.
7. ——— in the Heartſeaſe.
8. ——— in the Poppy.

Plate 37

Fig 1

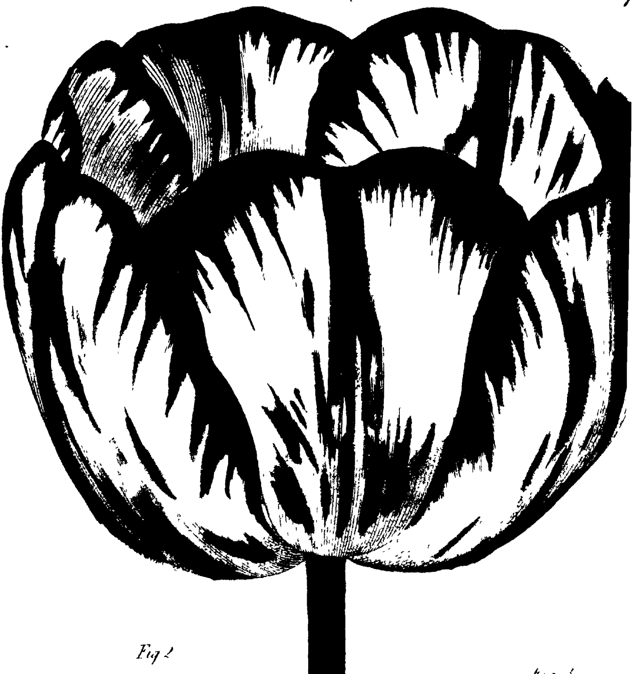

Fig 2

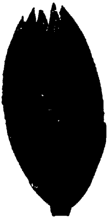

Fig 3

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PLATE XXXVII.

ON THE PARTS OF FRUCTIFICATION.

On the Calyx.

Fig. 1.—Shewing an inſtance wherein the Calyx is entirely wanting.

Example.
Tulip.

Fig. 2.—The Calyx of the Carnation, which for the ſupport of the Petal, Fig. 3. is not only very deep but of one entire piece, and ſtrengthened by ſeveral ſcaly ſupports at the bottom, otherwiſe the length of the Petals would break out of their regular order.

Plate 38

Fig 1

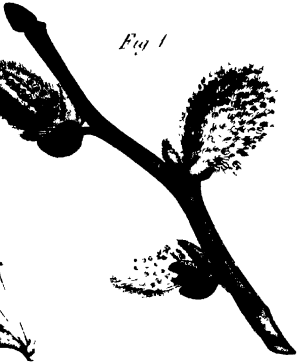

Fig 2

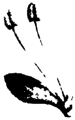

Fig 3

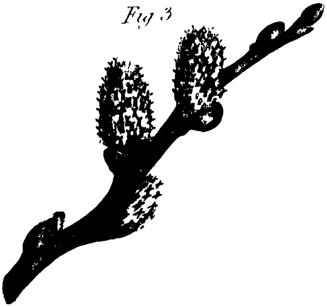

Fig 4

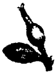

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PLATE XXXVIII.

ON THE PARTS OF FRUCTIFICATION.

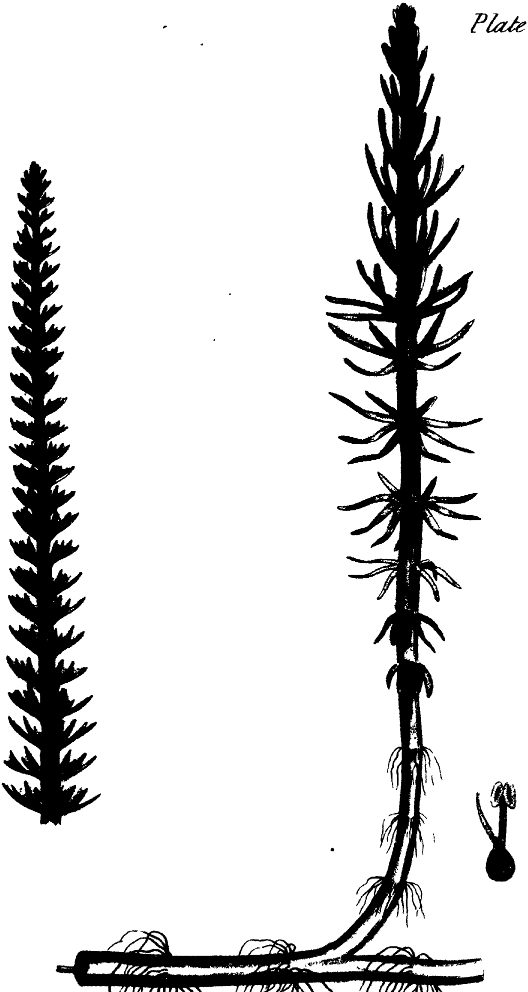
Fig. 1.—Shewing an inſtance wherein the Flower is unaccompanied by a Corolla, as in the Male Willow.

Fig. 2.—A ſingle Flower of the Male Willow.

Fig. 3.—A Branch of the Female Willow.

Fig. 4.—A ſingle Flower of the Female Willow, ſelected, wherein the Corolla is alſo wanting.

Plate 39



Syd Edwards del Pub by W Curtis Florist Walworth, Feb 2[illegible] F Sansom sc

PLATE XXXIX.

ON THE PARTS OF FRUCTIFICATION.

Repreſenting the Hippuris, or Mareſtail, which has neither a Calyx nor Corolla, ſo that it is as ſimple a Flower as is poſſible, having but one Stamen and one Piſtillum.

Plate 17X

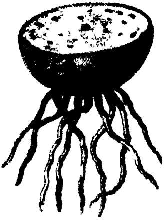
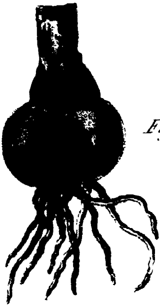


Fig 1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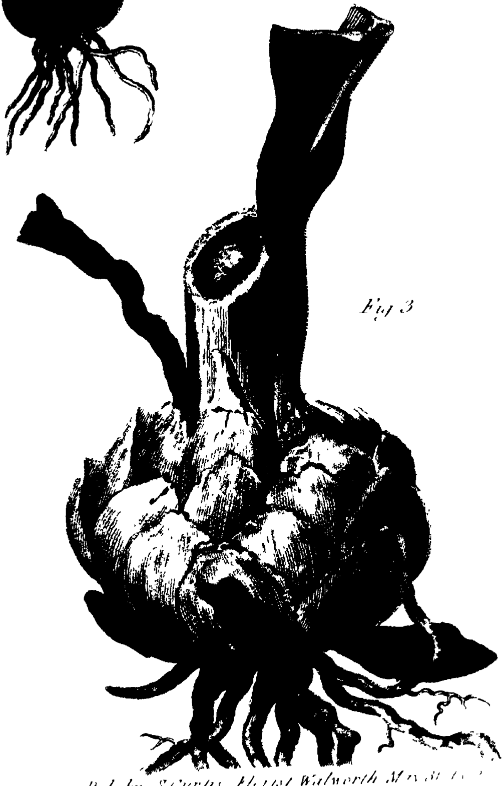
Fig 3

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PLATE XVII. ✠

ON ROOTS.

Fig 1.—Radix Solidus; a root which is ſolid, and not diſpoſed in ſcales as in ſquamoſa, or in lamina as in tunicata.

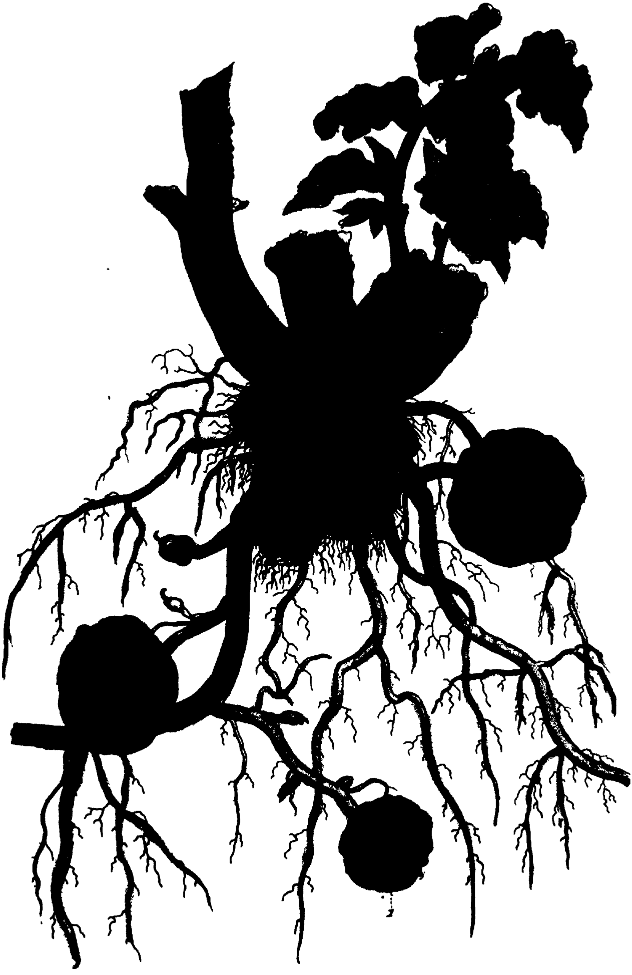
Fig. 2.—The whole bulb of the ſame.

Fig. 3.—Radix Squamoſa; a ſcaly root, a ſpecies of bulboſa, which is compoſed of ſcales lying over each other.

Example.

Lilium.

Plate 18 X



Publish'd by W. Curtis Florist Walworth June 30

PLATE XVIII. ✠

ON ROOTS.

Shewing a ſpecies of the Radix Tuberoſa, which is pendulous, and to illuſtrate a way by which roots are encreaſed, viz. by the roots, as theſe are well known to poſſeſs that quality in an eminent degree.

Example.

Potatoe.

Plate 10

Fig 1

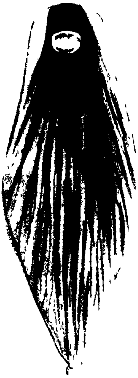


Fig 2

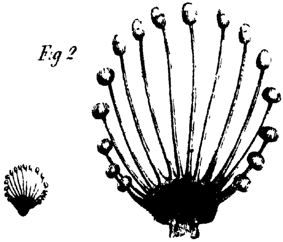


Fig 3

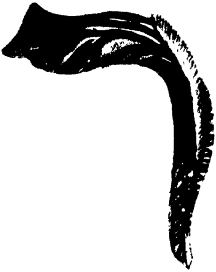


Fig 4

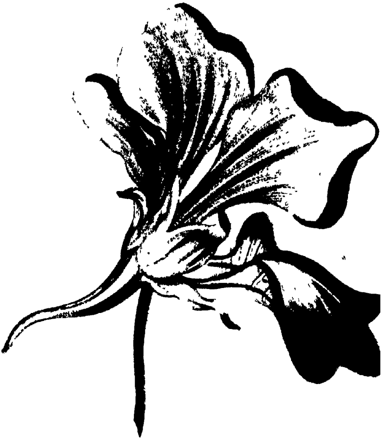


PLATE XIX.

ON THE PARTS OF FRUCTIFICATION.

On the Nectarium.

Fig. 1.—Nectarium in the Crown Imperial, in form of a gland, ſecreting Honey.

Fig. 2.—Nectarium in the Graſs of Parnaſſus.

Fig. 3.—Nectarium in the Iris, in form of a beard, extending itſelf up the baſe of the Petal.

Fig. 4.—Nectarium in the Naſturtium, wherein it is extended to a long point.

Plate 41

Fig 1

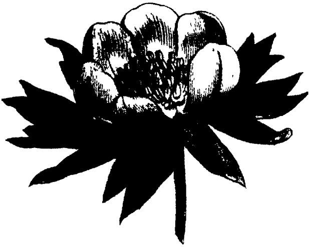


Fig 2

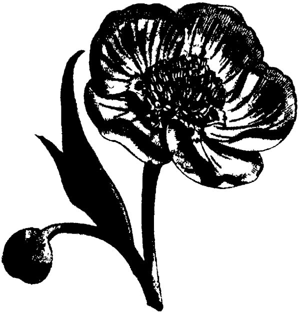


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PLATE XLI.

ON THE PARTS OF FRUCTIFICATION.

Shewing the difference that ſubſiſts betwixt two Plants of the ſame Genus, with reſpect to the texture of their Corollas; the Helleborus Hyemalis, which is of a delicate texture, and ſoon falls off; whereas in the Helleborus Fœtidus it is very thick and clumſy, and remains till the ſeeds are ripe.

Plate 34

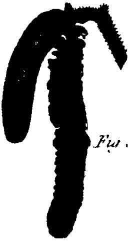
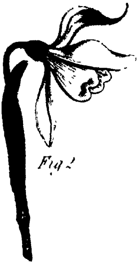


Fig 3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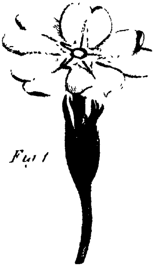


Fig 1

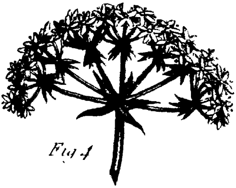


Fig 4

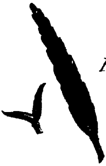
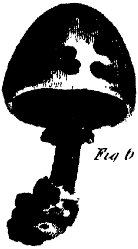


Fig 5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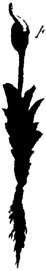
Fig 7

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PLATE XXXIV.

ON THE PARTS OF FRUCTIFICATION.

The Calyx.

Fig. 1.—Calyx Perianthium, as in Primroſe.
2. —— Spatha, as in Snow-drop.
3. —— Amentum, as in Hazel.
4. —— Involucrum, as in Hemlock.
5. —— Gluma, as in the Graſſes.
6. —— Volva, as in Muſhrooms.
7. —— Calyptra, as in Moſſes.

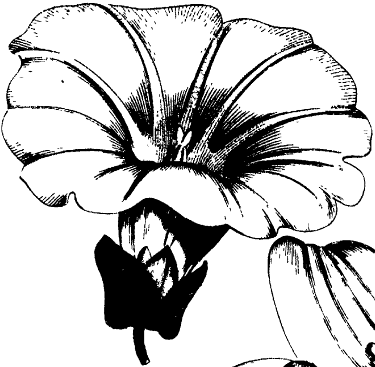
Fig 1

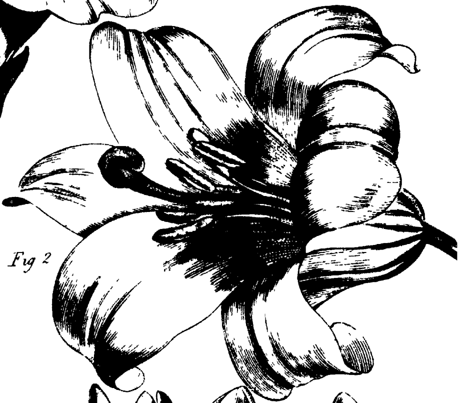
Fig 2

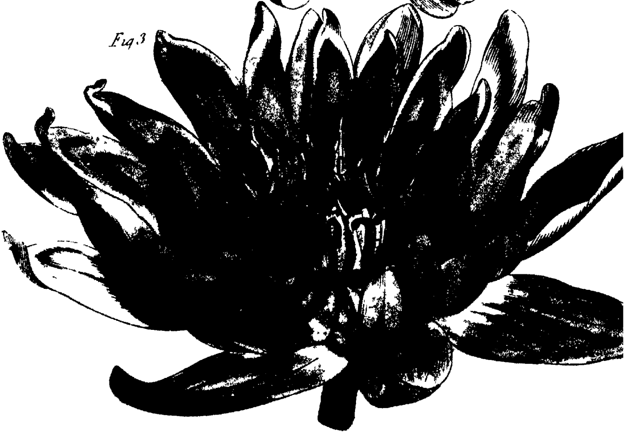
Fig 3

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PLATE XL.

ON THE PARTS OF FRUCTIFICATION.

On the Corolla.

Fig. 1.—Illuſtrating the terms which Corollas receive from their number of Petals, this being Monopetalous, i. e. the Corolla being of one entire piece.

Example.

Convolvulus.

Fig. 2.—Hexapetala, a Corolla, conſiſting of ſix Leaves or Petals.

Example.

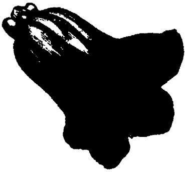
Lily.

Fig. 3.—Polypetala, conſiſting of many Leaves or Petals; when they amount to a conſiderable number they are thus diſtinguiſhed.

Example.

Water Lily.

Fig 1



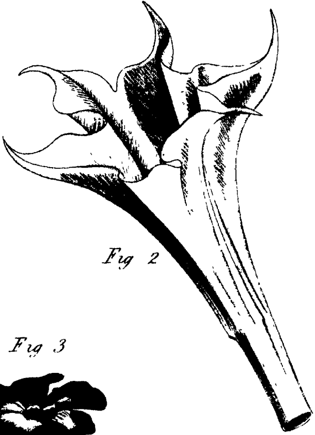


Fig 2

Fig 3

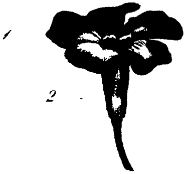


Fig 4.

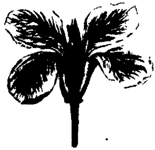


Fig 5

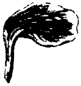


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PLATE XXXV.

ON THE PARTS OF FRUCTIFICATION.

On the Corolla.

Fig. 1.—Campanulata or Bell ſhaped.

Example.
Deadly Nightſhade.

Fig. 2.—Infundibuliformis or Funnel ſhaped.

Example.
Thorn Apple.

Fig. 3.—Hypocrateriformis or Salver ſhaped, having a flat limb. 1. Placed on a tube. 2.

Example.
Perriwinkle.

Fig. 4.—Cruciata or Croſs ſhaped, when compoſed of four equally ſpreading Petals, ſomewhat reſembling a croſs; the upper part of the Petal is called the Lamina, the bottom the Unguis or Claw. Fig. 5.

Example.
Wallflower.

Plate 15

Fig. 1.

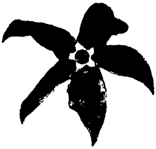

Fig 2

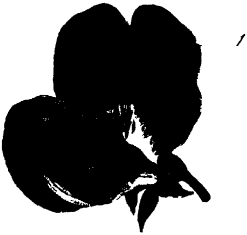

Fig 3.

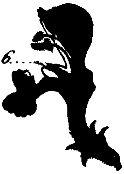

Fig 4

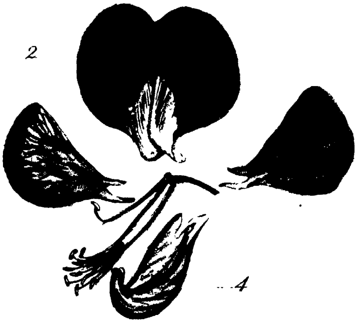

Fig 5

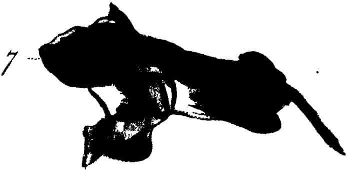

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PLATE XV.

ON THE PARTS OF FRUCTIFICATION.

On the Corolla.

Fig. 1.—Rotata or Weel ſhaped, having a flat limb without any tube.

Example.

Borage.

Fig. 2.—Papilionacea, as in the Pea.

Fig. 3.—Ringens, gaping or grinning, an irregular Corolla, which divides into two lips, the opening betwixt which is called the Faux or Mouth.

Fig. 5.—A ſimilar Corolla called Perſonata, differing in having the Mouth ſhut. 7.

Example.

Snapdragon.

Fig. 4.—The Papilionaceous Corolla diſſected. 2. The Vexillum or Standard. 3. The Ala or Wings. 4. The Carina or Keel.

Example.

Sweet Pea.

Fig 1

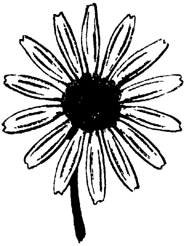

Fig 2

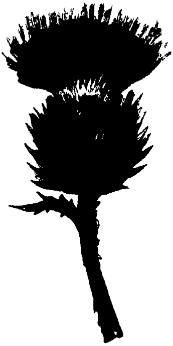

Fig 3

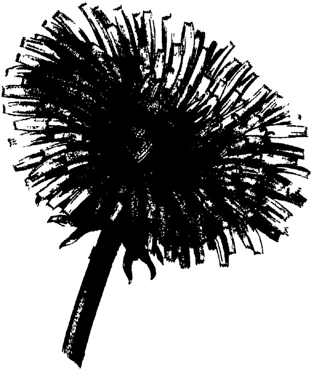

PLATE XLVII.

ON THE PARTS OF FRUCTIFICATION.

On Compound Flowers.

Fig. 1.—Radiata, when the Florets in the center are tubular, and thoſe in the circumference flat and ſpreading

Fig. 2.—Tubuloſa, when all the Florets are tubular, and nearly equal, as in the Thiſtle.

Fig. 3.—Ligulata, when all the Florets are flat, as in the Dandelion.